Section 22

New Hampshire Water Supply Planning Study, Bartlett, Conway, Jackson

August 1990

US Army Corps of Engineers
New England Division

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The purpose of the study was to document the problem and to provide information to the State of New Hampshire, Department of Environmental Services, Division of Water Supply which they could use to aid in the planning for water supply in this area. The issue investigated is the proliferation of small on-site public water supply systems at primarily second home condominium and townhouse developments. The NH DES DWS is concerned that construction of these on-site systems is not the only or best alternative to providing water supply at these developments.

The results of the preliminary assessment indicate that extending the precincts to serve the developments is possible but requires the development of additional piping, pumping, storage and water supply in the precincts. The benefit to the consumer is provision of water for domestic need without the concern for system operation and maintenance. However, the reality of cost and construction at the local level may make this concept difficult to pursue.

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NEW HAMPSHIRE WATER SUPPLY PLANNING STUDY
BARTLETT, CONWAY, JACKSON

prepared for

New Hampshire Department of Environmental Services
Division of Water Supply

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASSACHUSETTS

August 1990

EXECUTIVE SUMMARY

The State of New Hampshire, Department of Environmental Services (DES), Division of Water Supply requested planning assistance with water supply in the communities of Bartlett, Conway, and Jackson under the Section 22, "Planning Assistance to the States" program (PL 93-251, as amended). The issue investigated is the proliferation of small on-site public water supply systems at primarily second home condominium and townhouse developments in these communities. The New Hampshire Division of Water Supply is concerned that the proliferation of these small systems often run by the homeowners' association or the developer is not the best alternative to water supply at these developments.

The scope of work involved collection of available information from NH DES files, compilation of information on the existing water supply at the developments and in the towns, discussion of water supply problems at the developments, and conceptual design and ballpark cost estimates of one alternative approach to water supply at the developments. The alternative assessed was extension of the existing town water precincts to serve the developments.

The results of the preliminary assessment indicate that extending the precincts to serve the developments is possible but requires the development of additional piping, pumping, storage and water supply in the precincts. The benefit to the consumer is provision of water for domestic need without the concern for system operation and maintenance. However, the reality of cost and construction at the local level may make this concept difficult to pursue.

It is recommended that environmental impacts, financial feasibility, and institutional impacts of extending the precincts to serve the developments be investigated. It is recommended that representatives from the existing town water precincts become involved in planning for water supply at the condominium developments.

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STUDY AUTHORITY

The State of New Hampshire, Department of Environmental Services, Division of Water Supply requested planning assistance under Section 22, Public Law 93-251 as amended "Planning Assistance to the States" program. Section 22 authorizes cooperation between the Corps of Engineers and the states in the preparation of plans for the development, use, and conservation of water and related resources. Funding for the program is appropriated by Congress each fiscal year. Annually staff engineers from New England Division meet with representatives from Connecticut, Massachusetts, Maine, New Hampshire, Rhode Island, and Vermont to review requests for assistance. Efforts under this program are limited to in-house analysis of existing data. The purpose and content of this study was developed in meetings with the New Hampshire Department of Environmental Services, Division of Water Supply (NH DES DWS) during July and August of 1989.

STUDY PURPOSE AND SCOPE

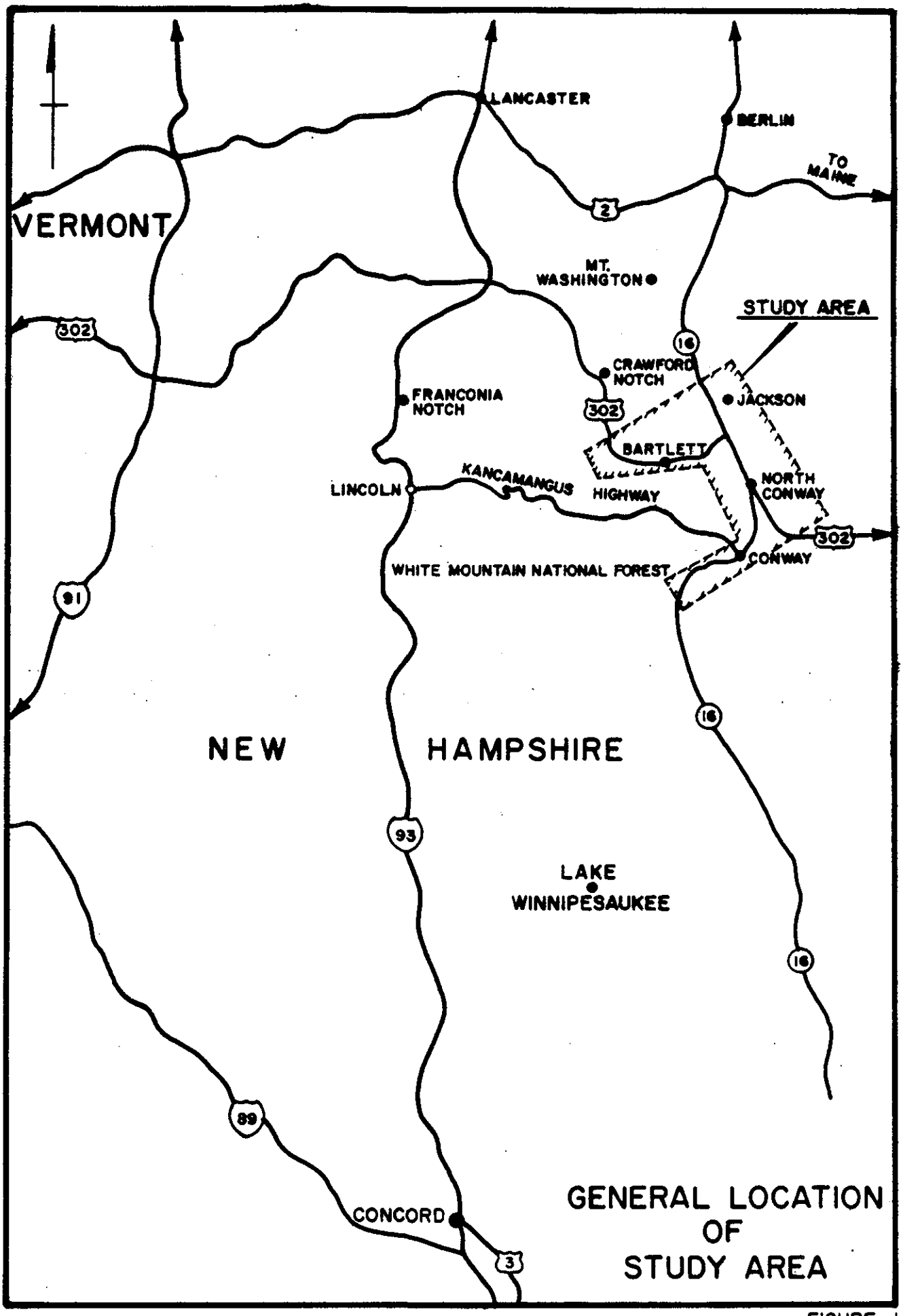
The study area is the towns of Jackson, Bartlett and Conway. (see Figure 1) Water in these communities is currently supplied by five water precincts, small public on-site systems and private wells. The five water precincts in the area are the Bartlett Village Fire Precinct, Lower Bartlett Water Precinct, Conway Village Fire Precinct, North Conway Village Water Precinct, and the Jackson Water Precinct.

Small on-site public water supply systems in this study are those that supply water to the public for consumption on a regular basis and operate 15 or more service connections or regularly serve at least 25 persons. Systems such as supplies at restaurants, hotels, and individuals homes are not included in the study.

The issue investigated is the proliferation of small on-site public water supply systems at primarily second home condominium and townhouse developments. The NH DES DWS is concerned that construction of these on-site systems is not the only or best alternative to providing water supply at these developments.

The purpose of the study was to document the problem and to provide information to the NH DES DWS which they could use to aid in the planning for water supply in this area.

The scope of work involved collection of available information from NH DES files, compilation of information on the existing water supply at the developments and in the towns, discussion of water supply problems at the developments, and conceptual design and ballpark cost estimates of one alternative approach to water supply at the developments. The alternative assessed was extension of the existing water precincts to serve the developments.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DESCRIPTION OF STUDY AREA

LOCATION

The communities of Jackson, Bartlett and Conway are located in New Hampshire adjacent to the White Mountain National Forest. (Figure 1) The major roadways through the area are Route 16 and Route 302. General topography consists of high mountains and very steep valleys, with elevations ranging from approximately 400 to 4,000 feet. The Saco River originates in this area and major tributaries to the Saco River in the area are the Swift and Ellis Rivers. The Saco River flows east from Bartlett to North Conway, then flows south through Conway where it turns east again towards Maine. Often water supplies in this area are either associated with a tributary to the Saco or are in the aquifer adjacent to the river.

POPULATION

Population projections for the area were obtained from North Country Council Inc. (1989) and are presented below. These numbers represent year-round permanent population and do not reflect the large seasonal or transient population that vacations or owns second homes in the area. Numbers on seasonal population were not available. However, these permanent population numbers are presented to provide the reader with a measure of the size of the towns discussed in this study.

Table 1. Population characteristics

				Percentage Change	
	1980	1987	2010	1980-87	1980-2010
Bartlett	1,566	1,587	2,312	1	48
Conway	7,158	8,353	14,823	17	107
Jackson	642	637	1,326	1	107
Total:	9,366	10,577	18,461	1	97

Conway with about 8,353 people has the greatest permanent population of the three communities and includes areas known as North Conway, Conway, and Center Conway. Bartlett includes areas known as Bartlett, Goodrich Falls, and Glen. Jackson with about 637 people has the smallest population.

The permanent population in the communities is expected to continue to increase through the population projection period. The total permanent population in 1987 is estimated at about 10,577 and expected to reach 18,461 by 2010. This represents a doubling in permanent population over the thirty year period from 1980 to 2010.

RECENT GROWTH

Recreational areas at the mountains and brooks, ski resorts, and vacation resorts and inns make tourist services and retail trade important contributors to the economy and growth of the region. Ski resorts in the area include Mountain Attitash, Wild Cat, Cranmore, and Black Mountain.

During the last decade the communities of Bartlett, Conway, and Jackson have experienced residential development related to the recreation industry which includes condominiums, townhouses, time-share units and other luxury residences primarily used as vacation homes. These developments are located in relatively flat areas along Routes 16 and 302 as well as upon the steeper slopes adjacent to the mountains.

The issue of water supply at these residential developments is the focus of this report.

EXISTING CONDITIONS

SMALL PUBLIC WATER SYSTEMS

Inventory

There are many small on-site public water systems serving the new primarily second home residential developments in the communities of Bartlett, Conway and Jackson. These systems provide water to developments with population from about 25 to 1,000 persons without fire protection capability. For this study, information on these systems was compiled from files in the New Hampshire Department of Environmental Services, Division of Water Supply (NH DES DWS) in Concord, New Hampshire (July-August 1989).

Information collected on the small public on-site systems included the location of system, the number of home units approved by the NH DES DWS for supply from the system, the EPA identification number assigned to the system, the source, capacity and quality of the raw water supply, and any recorded monitoring or supply inadequacies. Information compiled for each system is presented in Appendix A.

A list of the systems compiled from the files and organized by communities is presented in Tables 2, 3, and 4 and shown on plates 2, 3, and 4. It is believed that this list represents most of the developments in the communities served by small on-site public water systems, however there may be sites that were not included because of lack of file information.

There were 69 systems inventoried with number of units at a site ranging from approximately 10 units to 250 units. Residential units at the developments included condominiums, townhouses, and detached single family units. Total number of units approved by the NH DES DWS for these water systems is estimated at about 4006 units.

NH DES DWS suggested that 2.7 persons per unit is a reasonable estimate of population depending on these public water supply systems and estimate that most of these units are occupied on a seasonal basis. This represents about 11,000 people who depend on these systems for water supply during some part of the year.

Table 2. Small Public Water Supply Systems in Bartlett

Name of System	EPA# C016...	# of units approved
1. Eagle Ridge	001	120
2. Stillings Grant	005	262
3. Goodrich Falls	103	16
4. Holiday Ridge	201	50
5. Saco Ridge	202	26
6. North Ledge	205	32
7. Glen Acres	206	17
8. Linderhof Golf	207	119
9. Mt. Attitash Assoc.	208	18
10. Linderhoff Mt/side	209	231
11. River Bend	210	15
12. Birchview on Saco	211	100
13. Rolling Ridge	213	29
14. Cobb Farm	214	28
15. Cathedral Trail I	215	48
16. Cathedral trail II	216	40
17. River Run	217	152
18. Blueberry Condos	218	16
19. Crawford Hill	219	46
20. Top Notch Condos	220	36
21. Mt. Side/ Attitash	221	60
22. Christmas Mt.	222	96
23. Partridge Woods	223	48
24. Four Seasons Attitash	224	176
25. Bartlett Place	225	61
26. Village Bianco	226	15
27. Nordic Village	227	143
28. Rocky River	229	40
29. Attitash Woods	230	54
30. Wispering Brook	231	12
31. Pine Glen	232	20
32. Crawford Pond	233	46
33. Bear Village South	234	26
34. Goodrich	235	100
35. Kearsarge Estates	236	15
36. The Meadows	237	14
	Total:	2327

Table 3. Small Public Water Supply Systems in Jackson

Name of System	EPA# C121...	# of units approved
37. Eagle Mountain East	002	40
38. Tyrol Development	202	12
39. Wildcat Condo	203	28
40. Jefferson/Madison	205	30
41. Ellis R. Village	206	8
42. Black Mt. Meadow	208	17
43. Black Mt. Pastures	209	10
44. Spruce Mt.	212	60
	Total:	205

Table 4. Small Public Water Supply Systems in Conway

Name of System	EPA# C05...	# of units approved
45. Deerpath Vill.	001	47
46. Davis Hill	002	248
47. Birch Hill East	201	150
48. Birch Hill West	202	45
49. Cathedral Ledge	203	55
50. Conway East	204	32
51. Echo Lake Woods	205	52
52. Forest Edge	206	77
53. Forest Park Vill.	207	26
54. Hunting Ridge	208	65
55. Lake Pine Condos	209	14
56. North Pines	211	29
57. Saco R. Forest	212	20
58. Woodland Grove	213	59
59. South Pines	214	28
60. Deerbrook	215	16
61. Old Mill East	216	60
62. Oak Wood Heights	217	63
63. Saco Pines	218	20
64. Brook View	219	16
65. Cedar Creek	220	42
66. Near Ledge	221	25
67. Melody Pines	223	50
68. Saco Woods	225	90
69. Mt. Vale Village	310	145
	Total:	1474

Design Standards

As the developments are built usually one or more wells are drilled for water supply purposes. A pump house is built in the vicinity of the well(s), atmospheric and hydropneumatic storage is provided and the distribution system installed. After a development is completed and units sold the responsibility of operating the water supply system is often left to the homeowners' association which is then responsible for maintaining the system and controlling the quality of the water supplied.

In order to protect public health and safety, New Hampshire DES (1986) published design standards for small public water systems which require that all proposals for a system be submitted to their Water Supply Division for review and approval. These standards specify all aspects of the water supply system. Once the system becomes operational the law requires that the owner provide periodic water quality sampling, record keeping, and maintenance of reliable service.

Water Demand

There were no meter records, in the files, of water supply demand at the developments, but for the purposes of this study equation (1) was used for calculating the average daily demand at the developments. This equation was suggested by the NH DES DWS. This estimate should be regarded as preliminary. A more detailed study of water use in the area would be required to improve the estimate.

(1) Ave. daily demand = # of units * 2.5 bedrooms * 150 = gpd

The total average day demand calculated for the 69 systems inventoried is about 1.5 mgd.

Water Quality

An examination of the water quality reports shows that raw water in the region generally complies with most of the prescribed standards promulgated relative to the National Safe Drinking Water Act (PL-93-523). However, water quality varied from site to site and iron, manganese and fluoride in some cases was reported above the recommended levels. In a few instances water samples reported high uranium levels, and in these cases the wells were not approved and other sources of supply were sought. Water in this region tends to be corrosive; corrosive water has the ability to leach metals from plumbing.

Potential water quality problems identified at sites included violation of water quality testing requirements and inadequate protective radius at well sites from potential contamination sources.

Water Quantity

There did not appear to be a lack of groundwater quantity at these small on-site systems. Developments usually had one or two wells with combined reported capacities of wells at a development ranging from 10 kgal/day to 432 kgal/day. The total estimated supply of all of these wells is 6.2 mgd. The quantity of water available at the site appears to be adequate to satisfy existing demand.

System Operation

Although the NH DES DWS requires a licensed operator for each system, the operator may not spend much time at each site, and this may leave the homeowners' association responsible for system operation between visits by the licensed operator. Problems with inadequate pressure at point of delivery and loss of water service for one or more days was noticed while reviewing the files.

WATER PRECINCTS

Description of the Precincts

Five water precincts serve the residents of the communities of Bartlett, Conway, and Jackson in the centralized areas along Route 302 and Route 16. Plate 1 shows the approximate service areas of the precincts. These service areas range in size from approximately 1 to 9 sq. miles.

The community of Bartlett is served by two water precincts, the Bartlett Village Fire Precinct and the Lower Bartlett Water Precinct. The community of Conway is served by the Conway Village Fire Precinct and the North Conway Water Precinct. The community of Jackson is served by the Jackson Water Precinct.

Information on the systems was obtained from NH DES DWS files including 1986 Facilities Summary fact sheets and available water supply reports. This information is presented in Table 5 and was verified with the water precincts over the telephone.

Water Demand

These precincts reportedly provide water to approximately 3,472 service connections. The demand in the water precincts varies with increasing demand during the winter ski season and summer holiday season. Reported average day demand in the precincts ranges from 0.15 mgd in the Lower Bartlett Water Precinct to 1 mgd in North Conway Water Precinct. Combined reported demand for Lower Bartlett, Conway Village, and North Conway is about 1.9 mgd. Demand estimates are not available for Jackson and Bartlett Village Precincts.

Table 5. Water precincts in Bartlett, Conway, and Jackson.

Precinct and Approx. Elev. (NGVD)	Reported No.Service Connections	Source and Treatment	Reported Yield (gals/day)	Reported Storage and Approx.Elev. (NGVD)	Reported Ave. Day Demand (gals/day)
Bartlett Vill. at 680 ft.	250	1mg Reservoir screen and chlorinate	not avail.	none	no meter
Lower Bartlett at 540 ft.	340	groundwater 2 wells corrosion protection	1,080,000	2 tanks 250,000 gal tank 500,000 gal tank @900 ft.	150,000
Jackson Vill at 740 ft.	152	infiltration wells beneath Ellis River chlorination	not avail.	2 tanks	not available
Conway Vill at 460 ft.	730	groundwater 2 wells	1,800,000	1 tank 250,000 gal tank	794,000
North Conway at 500 ft.	2,000	groundwater 3 wells	2,700,000	2 tanks 2,000,000 gal tank @730 ft. 2,000,000 gal tank @810 ft.	1,000,000

Water Quality

The quality of the raw water in the water precincts is generally good, but does require some treatment. Treatment reported included chlorination and corrosion protection.

Water Quantity

The precincts obtain water from groundwater and surface water. Wells are located adjacent to the Ellis, Swift, and Saco Rivers. Combined reported yields for the wells in Lower Bartlett, Conway Village, and North Conway is about 5.6 mgd. Bartlett Village is supplied by a 1 mg surface water reservoir in the White Mountain National Forest.

Service Charges

Service charges in the Water Precincts are summarized in Table 6. This information was obtained by telephone calls to the water precincts. The annual water rates in the precincts varied from about $80/year in the Bartlett Village Water Precinct to $200/year in the Lower Bartlett Water Precinct. Current connection charge policy in the water precincts is to charge the new service any pipe installation costs and in some precincts an initial hook-up fee.

Table 6. Reported Water Rates Charged by Water Precincts in 1989

Precinct	Service Charge	Connection Charge
Bartlett Vill.	$80/year	installation costs
Lower Bart.	$1.80/$1,000 house assessment plus water tax $2.12/year	$3,000/unit fee plus cost of any pipe installation
Jackson	$150/year/meter plus $0.95/1000 gal	installation cost with minimum of $50
Conway Vill.	$57.20/bathroom/year	installation costs
North Conway	$85/year	$200/unit fee plus installation cost

DISCUSSION

Although the NH DES DWS, reviews and approves the on-site small public water supply systems for these developments according to the published design standards, they question whether the development of these individual systems is the best alternative for water supply in the area.

Problems noted at the small public on-site systems include insufficient pressure at point of delivery, inadequate protective radius at well sites, violation of water quality testing requirements, and loss of water service for one or more days.

Although not documented in the NH DES files it has been indicated in literature from the American Water Works Association that in addition to a system operator this type of system may need an accountant, a bill collector, and a contact person for both state officials and local residents. (AWWA 1990)

A study on management and operation of small on-site systems in NH would need to be undertaken in order to document all the problems and costs associated with maintenance and operation of this type of system in NH.

NH DES DWS subscribes to the concept of regionalizing or consolidating these small on-site systems. The DES encourages cooperation and planning for water supply between the homeowners', the developers and the water precincts. Providing the opportunity to connect to a larger system is seen as providing long term benefits to the consumer.

If these small systems were connected to a larger public system with a full time staff person(s) and a larger customer base the consumer would have the convenience of water delivered to their homes without concern for operation and maintenance of the wells and distribution systems, compliance with sampling and testing requirements for the supply water, and dealing with emergency or contamination events. In addition fire protection supply may be easier to offer with a larger public system.

One of the alternatives discussed with the NH DES DWS for water supply in the area is expansion of the existing water precincts to serve the developments. Based on these discussions and the available information it was decided to proceed with conceptual design and cost analysis of this alternative. The alternative consists of connecting the developments to the existing water precincts.

For purposes of this report it was assumed that water precinct political boundaries could be expanded without constraint. Environmental impacts, financial feasibility and institutional impacts were not assessed in this report.

EXTENSION OF WATER PRECINCTS

CONCEPTUAL DESIGN METHODOLOGY

A preliminary assessment of what might be involved in order to extend the existing water precincts to serve the developments was investigated using available information on the developments and the water precincts from the NH DES files, locating the developments relative to the existing water precincts, and calculating gross estimates of additional supply, storage, piping, and pumping requirements.

The information on the location of the developments and the location of the water precincts was obtained from maps in the NH DES DWS offices in Concord, New Hampshire. Information on distances from the water precincts to the developments and elevations of the developments was developed using USGS topographic maps for the area at a scale of 1:24000 with 20 ft. and 40 ft. contour information. Field verifying this information was not included in this study.

Water demand at the developments was estimated using the equation (1) suggested by the NH DES DWS for the purposes of this report. The number of units at a development was assumed to be the number of units approved for supply by the NH DES DWS.

(1) Ave. daily demand = # of units * 2.5 bedrooms * 150 = gpd

Water demand at the precincts was estimated as the reported average daily demand.

Additional water supply requirements were estimated by subtracting the calculated average day demand in the developments and the reported average day demand in the precincts from the reported yield in the water precinct.

Additional storage requirements were estimated based on the Great Lakes Upper Mississippi River Board (GLUMRB 1982) standards for water works which recommends that the minimum storage capacity to be provided without fire protection is the average daily consumption.

Gross estimates of pipe lengths were developed from USGS quad sheets.

Gross estimates of additional pumping for each new service area were calculated based on elevation changes from the precincts to the highest development to be served, assuming the total available head at the water precinct connection was the town elevation plus 138 ft.(60 psi.), the water pressure required at the point of delivery was 60 psi, rough estimates of frictional head loss were calculated along the length of the transmission mains and a peak flow of 1.5 x average day demand was assumed.

A complete hydraulic analysis of the conceptualized distribution system was not performed. This would require more detailed information on the existing systems then was available from the NH DES files.

COST METHODOLOGY

A computer program called MAPS, Methodology for Areawide Planning Studies, developed by the Corps of Engineers, Environmental Laboratory, Waterways Experimental Station was used to develop ballpark cost estimates for the alternative. The costs presented in this report are not to be used as engineering cost estimates for the projects.

The following economic data was used in MAPS to calculate costs. The June 1990 ENR construction cost index value of 4735 was used to update costs in the program. An operation and maintenance wage rate of $20 per hour was used to calculate operation and maintenance costs (O&M). An electric rate of 10 cents per kW-hr was used to calculate power costs. This rate includes an estimated charge for power supply and charge per kW-hr for electricity. Capital costs were amoritized over a 30 year investment period using an interest rate of 9.25 percent.

Storage tanks capital costs are calculated as the sum of tank constructions costs and indirect construction costs. Tank construction costs are calculated based on volume and assuming a ground level concrete tank. Land costs are not included. The O&M costs are calculated as 1 percent of the construction costs.

Estimates of pipe costs include the cost of purchasing, hauling, and laying the pipe and is dependent on the diameter, material, length, and the maximum pressure the pipe is manufactured to withstand. For purposes of this report pipe diameters of 6, 8, 10, 12 inches and ductile iron were specified. The "other cost" involved include excavation, backfill and contingencies. Construction costs are calculated as the sum of pipe costs and "other costs". The overhead costs include engineering, interest during construction, legal, fiscal, and administrative costs. These are calculated by MAPS as 25 percent of the construction cost. The estimated capital cost for the pipes are the sum of the construction and overhead costs. Capital cost for land, pipe valves, and pipe elbows are not included. The estimated annual O&M costs are calculated as a function of the pipe costs.

Estimates of pump station costs include cost of mechanical equipment, cost for the pump station structure, and "miscellaneous costs" (which include additional equipment costs and contingencies) multiplied by a design factor of 1.3. The estimated pump station capital costs are the sum of the constructions and overhead costs. Electrical equipment and costs for land are not included. The estimated annual operation and maintenance costs are calculated as the sum of power costs, labor costs, and supply cost factor. These cost estimates assume full time production and operation.

BARTLETT VILLAGE FIRE PRECINCT

This precinct currently supplies about 250 services from a 1 mg surface reservoir. The existing system is gravity feed from the reservoir.

Twenty systems (1278 units) with an estimated average day demand of 0.5 mgd are considered for connection to the water precinct. See Plate 2. Preliminary calculations for this alternative are included as Appendix B and summarized below. Conceptual design for this alternative indicates the extension of the precinct to supply the developments might require the following.

WATER SUPPLY and STORAGE

Additional water supply	0.5 mgd
Additional storage	0.5 mg

AREA WEST OF PRECINCT

Additional distribution piping	11,000 ft.
Create high elevation pressure zone	EL 760 ft.

AREA EAST OF PRECINCT

Transmission main along Route 302	25,000 ft.
Create high elevation pressure zone along route 302	EL 1,200 ft.
Additional distribution piping	30,000 ft.

COST ANALYSIS

Ballpark cost estimates for these additions to the existing system were calculated using MAPS as previously described. The costs for additional water supply and treatment are not included.

	Capital Cost (1990$)	O&M Cost ($/YR)	Ave. Annual Cost ($/YR)
WATER STORAGE			
Additional storage	425,000	3,400	45,700
AREA WEST OF PRECINCT			
Pump station No.2	77,800	4,190	11,900
6 inch dist.piping	259,000	973	26,700
AREA EAST OF PRECINCT			
8 inch trans. main	778,000	2,490	79,900
Pump station No. 1	168,000	44,500	61,200
6 inch dist.piping	706,000	2,650	72,900
Total (1990$)	2,413,800	58,203	298,300

These additions to the precinct represent a major change in size and operation of the Bartlett Village Fire Precinct. Most of the extension is to the east along Route 302.

LOWER BARTLETT WATER PRECINCT

This precinct serves about 340 service connections. Two wells with a reported capacity of about 1 mgd provide the water supply. The system has two storage tanks with a total capacity of 0.75 mg. Reported average day demand is about 0.15 mgd.

Three systems (185 units) with an estimated average day demand of about 0.07 mgd are considered for connection to the water precinct. See Plate 2. Preliminary calculations for this alternative are included as Appendix C and summarized below. Conceptual design for this alternative indicates the extension of the precinct to supply the developments might require the following.

AREA SOUTH OF PRECINCT

Additional distribution piping	2,500 ft.
Create high elevation pressure zone	EL 600 ft.

AREA NORTH OF PRECINCT

Additional distribution piping	10,000 ft.
Create high elevation pressure zone	EL 900 ft.

COST ANALYSIS

Ballpark cost estimates for these additions to the existing system were calculated using MAPS as previously described.

	Capital Cost (1990$)	O&M Cost ($/YR)	Ave. Annual Cost ($/YR)
AREA SOUTH OF PRECINCT			
Pump station No. 1	52,900	1,900	7,160
6 inch dist.piping	58,800	221	6,070
AREA NORTH OF PRECINCT			
Pump station No. 2	58,800	2,590	8,440
6 inch dist.piping	235,000	885	24,300
Total (1990$)	405,500	5,596	45,970

These additions to the Lower Bartlett Water Precinct represent a large increase in the number of service connections and demand but do not appear to represent a major change in the system except for identified pumping requirements. Extension to the system are to the north and south.

JACKSON WATER PRECINCT

This precinct currently provides water to approximately 152 units. Water is pumped from infiltration wells beneath the Ellis River. The system has two storage tanks.

Twenty-one systems (1069 units) with an estimated average day demand of 0.4 mgd are considered for connection to the water precinct. See Plate 3. Preliminary calculations for this alternative are included as Appendix D and summarized below. Conceptual design of this alternative indicates the extension of the system to supply the developments might require the following.

WATER SUPPLY and STORAGE

Additional water supply	0.4 mgd (1)
Additional storage	0.4 mg (1)

AREA SOUTH ALONG ROUTE 16

Transmission main along Route 16	8,000 ft.
Create high elevation pressure zone along Rte 16	EL. 1,300 ft.
Additional distribution piping	23,000 ft.

AREA EAST FROM ROUTE 16B

Transmission main to east	8,000 ft.
Create high elevation pressure zone to east	EL. 1,700 ft.
Additional distribution piping	20,500 ft.

AREA NORTH ALONG ROUTE 16

Transmission main along Route 16 north	16,000
Create high elev.pressure zone along Rte 16 north	EL. 1160 ft.
Additional distribution piping	6,000 ft.

(1) Information on existing demand, capacity of the wells and storage tanks was not available for the Jackson Water Precinct

COST ANALYSIS

Ballpark capital cost estimates for these additions to the existing system were calculated using MAPS as previously described. The cost for additional water supply and treatment is not included.

	Capital Cost (1990$)	O&M Cost ($/YR)	Ave. Annual Cost ($/YR)
WATER STORAGE			
Additional storage	370,000	2,960	39,800
AREA SOUTH ALONG ROUTE 16			
8 inch trans main	249,000	796	25,600
Pump station No. 1	159,000	39,900	55,700
6 inch dist.piping	541,000	2,030	55,900
AREA EAST FROM ROUTE 16B			
8 inch trans main	249,000	796	25,600
Pump station No.3	97,400	11,000	20,700
6 inch dist.piping	482,000	1,810	49,800
AREA NORTH ALONG ROUTE 16			
8 inch trans main	498,000	1,590	51,100
Pump station No.5	62,200	2,960	9,150
6 inch dist.piping	141,000	531	14,600
Total (1990$)	2,848,600	64,373	347,950

These additions to the precinct represent a major expansion in size and operation of the precinct. Many of the developments considered for connection are south of the precinct in Bartlett.

CONWAY VILLAGE FIRE PRECINCT

Conway Village Fire Precinct provides water to approximately 730 service connections. Water is drawn from two wells with a reported capacity of about 1.8 mgd. One 250,000 gal. tank provides water storage. The reported average day demand is about 0.8 mgd.

Fourteen systems (825 units) with an estimated average day demand of about 0.3 mgd are considered for addition to the precinct. See Plate 4. Preliminary calculations for this alternative are included as Appendix E and summarized below. Conceptual design for this alternative indicates the extension of the precinct to supply the developments might require the following.

WATER STORAGE

Additional water storage	1.0 mg

AREA EAST ALONG ROUTE 302

Transmission main along Route 302	28,000 ft.
Create high elevation pressure zone along route 302	EL 640 ft.
Additional distribution piping	36,000 ft.

COST ANALYSIS

Ballpark cost estimates for these additions to the existing system were calculated using MAPS as previously described.

	Capital Cost (1990 $)	O&M Cost ($/YR)	Ave. Annual Cost ($/YR)
WATER STORAGE			
Additional storage	653,000	5,220	7,020
AREA EAST ALONG ROUTE 302			
8 inch trans. main	871,000	2,780	89,400
Pump station No.1	132,000	16,900	30,100
6 inch dist.piping	847,000	3,190	87,500
Total (1990$)	2,503,000	28,090	214,020

These additions represent a major expansion of the existing system to service the developments east of the precinct.

NORTH CONWAY WATER PRECINCT

This precinct currently supplies about 2000 service connections. Water is drawn from 3 wells with a reported capacity of 2.7 mgd. The system has two storage tanks with a combined capacity of 4 mg. The reported average day demand is 1 mgd.

Ten systems (504 units) with an estimated average day demand of 0.2 mgd are considered for addition to the water precinct. See Plate 4. Preliminary calculations for this alternative are included as Appendix F and summarized below. Conceptual design for this alternative indicates the extension of the precinct to supply the developments might require the following.

AREA WEST OF SACO RIVER

Transmission main to west	13,000 ft.
Additional distribution piping	30,500 ft.
Create high elevation pressure zone	EL 660 ft.

Ballpark cost estimates for these additions to the existing system were calculated using MAPS as previously described.

COST ANALYSIS

	Capital Cost (1990$)	O&M Cost ($/YR)	Ave. Annual Cost ($/YR)
AREA WEST OF SACO RIVER			
8 inch trans.main	400,000	1,290	41,500
Pump station No.1	104,000	9,340	19,700
6 inch dist.piping	718,000	2,700	74,100
Total (1990$)	1,222,000	13,330	135,300

This extension to the existing service area would be on the west side of the Saco River. The current service area is on the east side. The extension might require one river crossing.

SUMMARY

The results of the preliminary assessment indicate that extension of the precincts to serve the developments is possible, but requires additional piping, pumping, storage and water supply development in the precincts. The estimated unit costs for the extensions are presented below.

Ballpark Cost Estimates(1)

Extension to Water Precinct	Additional Ave Day Demand (mgd)	Capital Costs (1990$)	Average Annual Cost (1990$)	Unit Cost (1990$/1000gal)
Bartlett Vill.	0.5	2,413,800	298,300	1.63
Lower Bart.	0.07	405,500	45,970	1.80
Jackson	0.4	2,848,600	347,950	2.38
Conway Vill.	0.3	2,503,000	214,020	1.95
North Conway	0.2	1,222,000	135,300	1.85

(1) Estimated costs do not include additional water supply, water treatment and land costs.

The benefit to the consumers is provision of water for domestic need without the concern for system operation and maintenance. However the reality of cost and construction to extend the precincts may make this concept difficult to pursue.

It is recommended that environmental impacts, financial feasibility, and institutional impacts of extending the existing precincts to serve the developments be investigated. It is recommended that representatives from the existing water precincts become involved in planning for water supply at these condominium developments.

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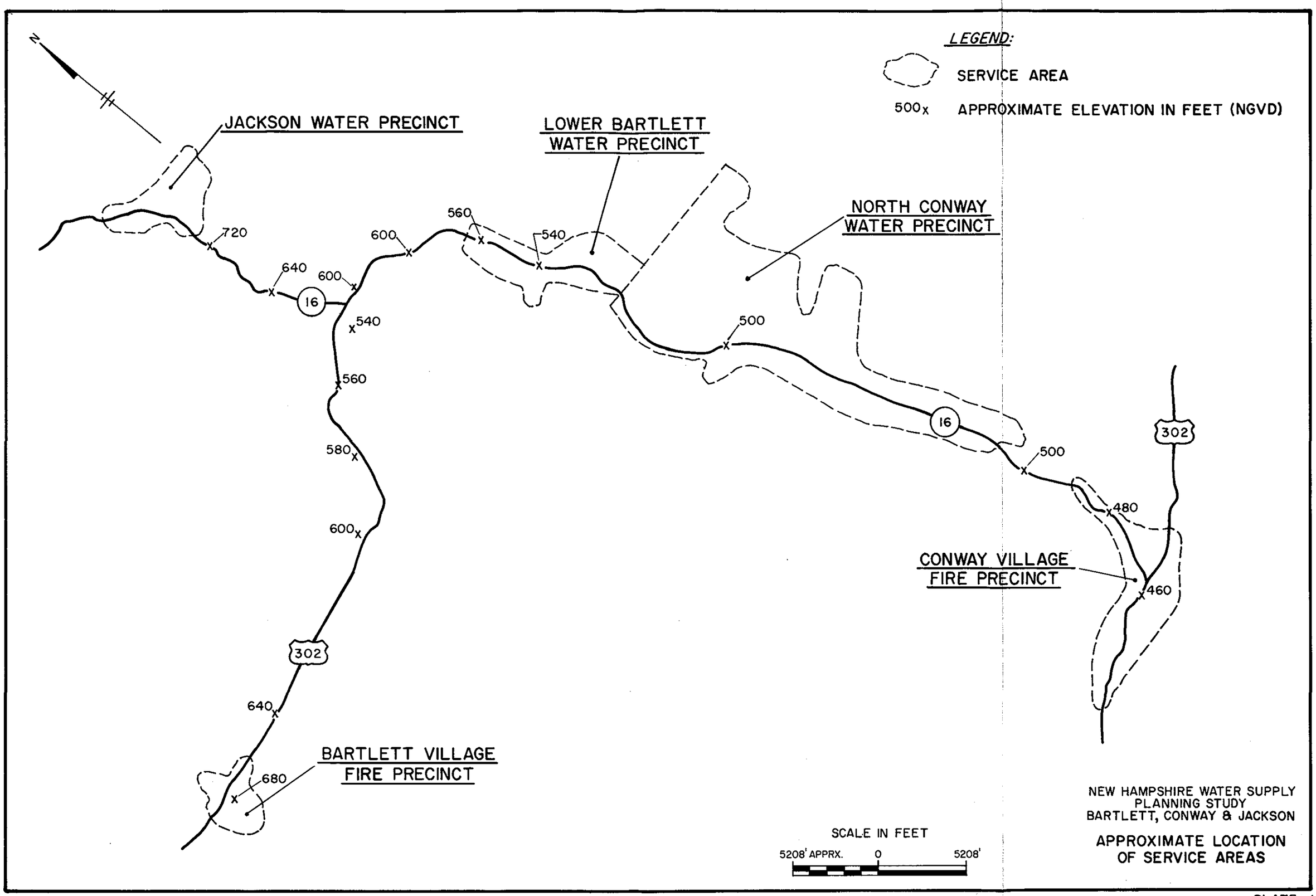
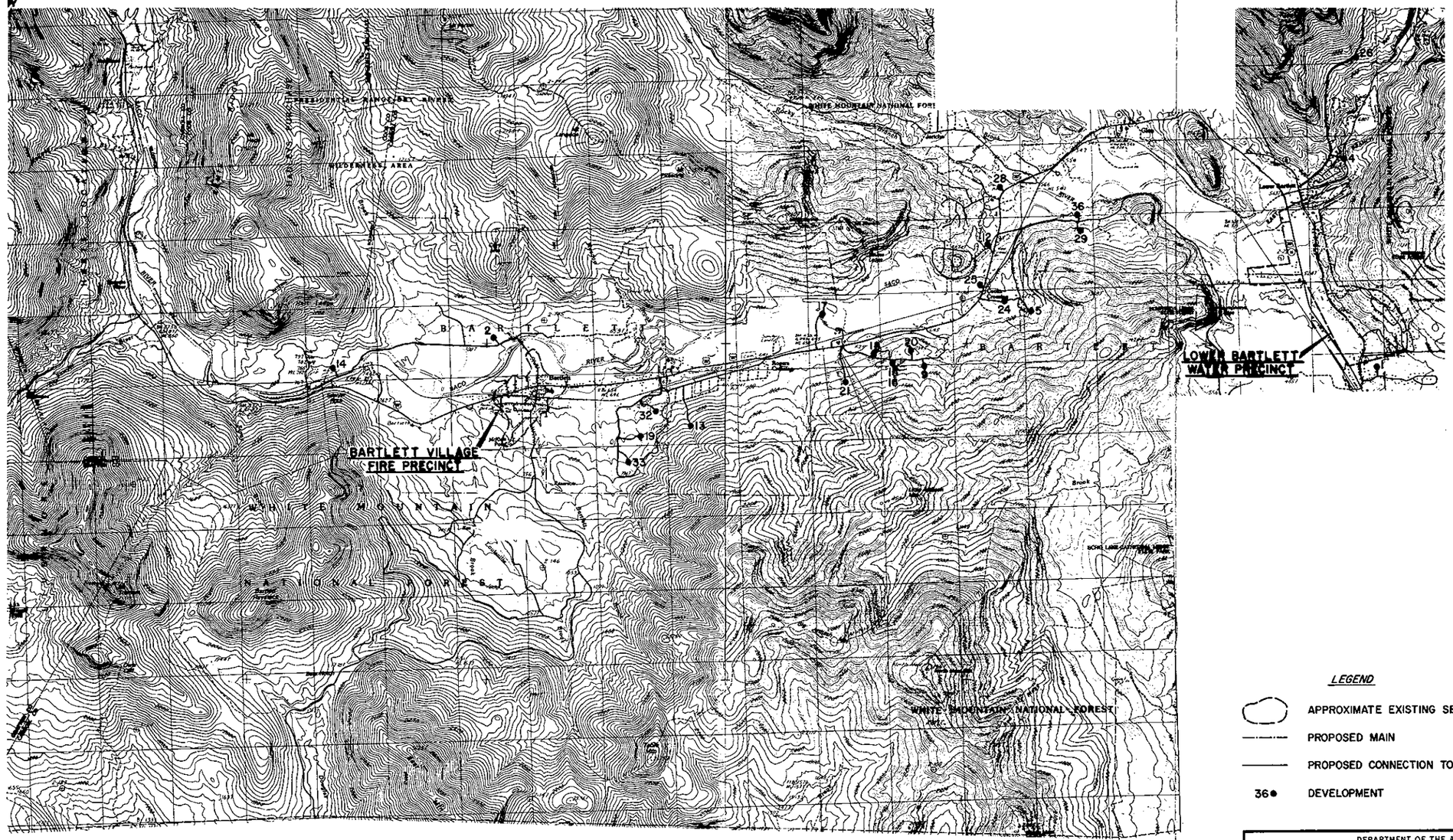


NEW HAMPSHIRE WATER SUPPLY
PLANNING STUDY
BARTLETT, CONWAY & JACKSON

APPROXIMATE LOCATION
OF SERVICE AREAS

PLATE 1



LEGEND

- APPROXIMATE EXISTING SERVICE AREA
- PROPOSED MAIN
- PROPOSED CONNECTION TO DEVELOPMENT
- 36● DEVELOPMENT

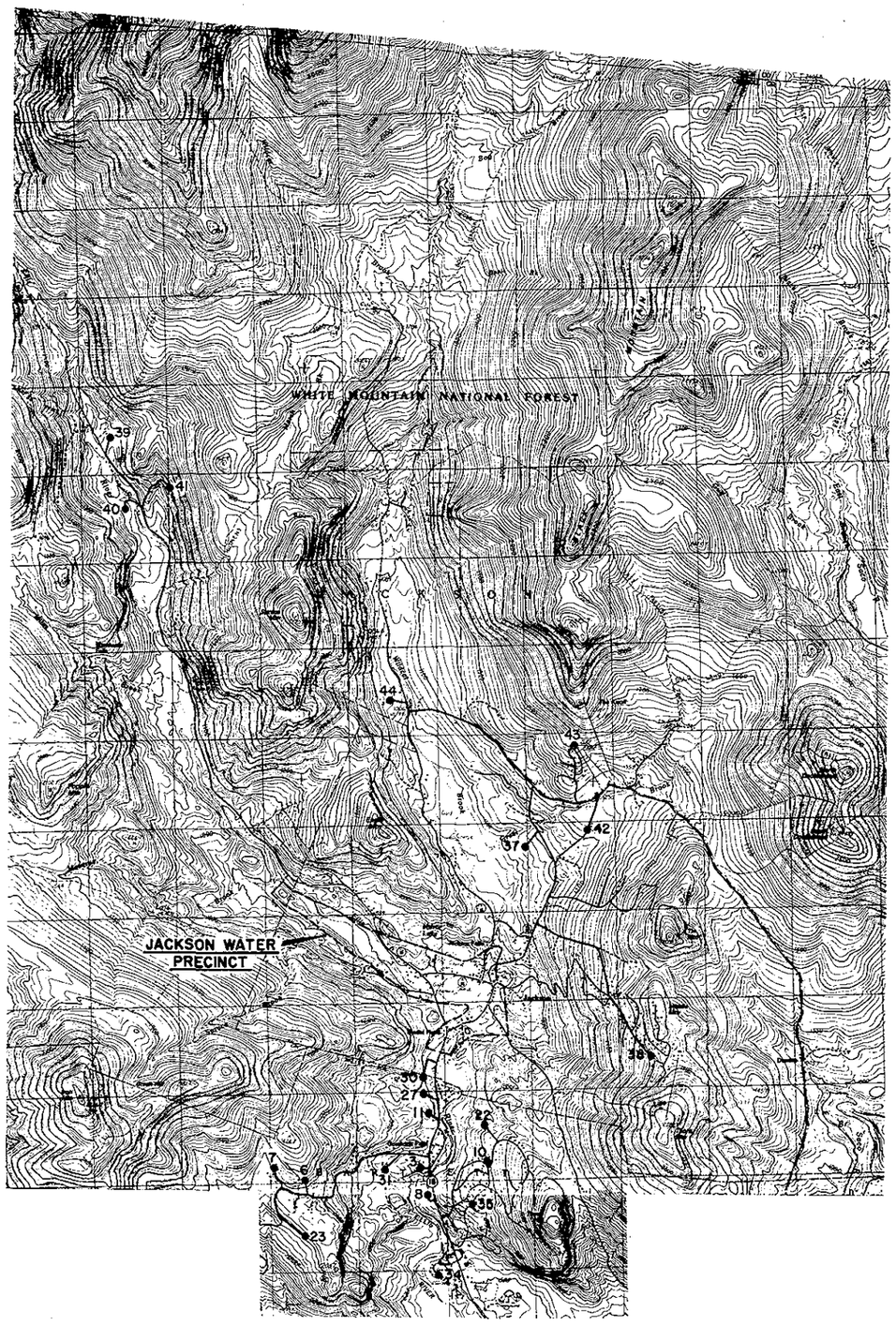
SCALE IN FEET
2000' 0 2000' 4000'

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.

NEW HAMPSHIRE WATER SUPPLY PLANNING STUDY
BARTLETT, CONWAY, JACKSON

BARTLETT VILLAGE FIRE PRECINCT
LOWER BARTLETT WATER PRECINCT

PLATE 2



LEGEND

- APPROXIMATE EXISTING SERVICE AREA
- PROPOSED MAIN
- PROPOSED CONNECTION TO DEVELOPMENT
- 44● DEVELOPMENT

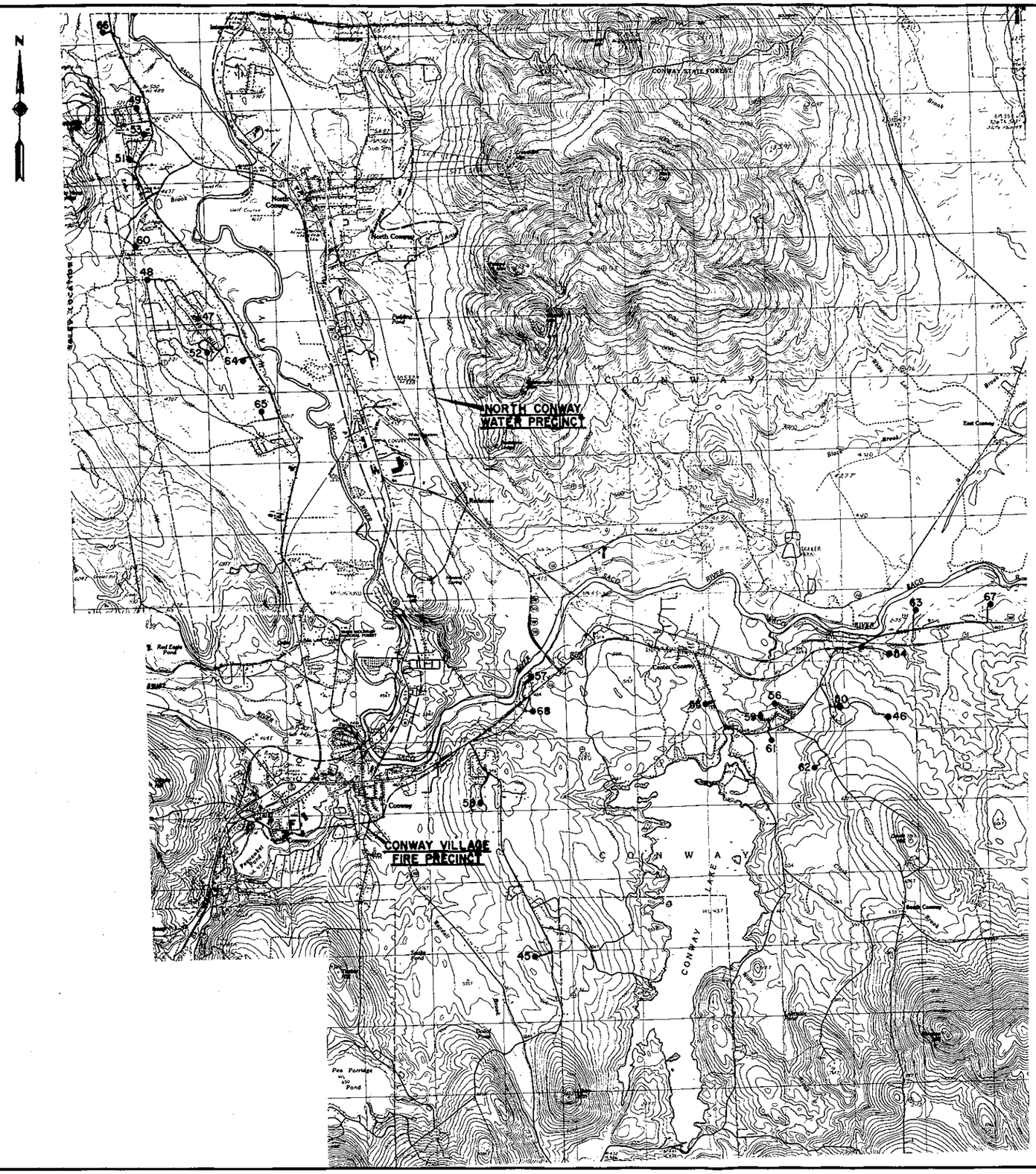
SCALE IN FEET
2000' 0 2000' 4000'

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.

NEW HAMPSHIRE WATER SUPPLY PLANNING STUDY
BARTLETT, CONWAY, JACKSON

JACKSON WATER PRECINCT

PLATE 3



LEGEND

- APPROXIMATE EXISTING SERVICE AREA
- PROPOSED MAIN
- PROPOSED CONNECTION TO DEVELOPMENT
- 48● DEVELOPMENT

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.

NEW HAMPSHIRE WATER SUPPLY PLANNING STUDY
BARTLETT, CONWAY, JACKSON

NORTH CONWAY WATER PRECINCT
CONWAY VILLAGE FIRE PRECINCT

PLATE 4

Appendix A

Inventory of Small Public Water Supply Systems in Bartlett, Conway, and Jackson, N.H.

NAME Attitash Woods LOCATION Bartlett

Lemm Development Corp. EPA # C 016 2300

ADDRESS P.O. Box 99 Intervale NH

PHONE # 356-2301

NO. OF SERVICE CONNECTIONS 54 DATE 1988

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Well # 1	30 gpm	3/88
Well # 2	60 gpm	3/88

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM Pumped

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
Steel atm. tank	10,000 gal	
Steel press. tank	1,700 gal	

QUALITY OF RAW WATER
High Fe. and mn. levels

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

NAME Bartlett Place LOCATION Bartlett

Barry Wood EPA # C 016 2250

ADDRESS Box 12, Bartlett, NH 03812

PHONE # 374-6652

NO. OF SERVICE CONNECTIONS 61 DATE 1987

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Well # 1	85 gpm	10/87

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
Tank		

QUALITY OF RAW WATER
High iron levels.

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS Victorian style Condos $136000/unit on Saco River
still building

NAME Bear Village South LOCATION Bartlett

Rene Pelletier EPA # C 016 2340

ADDRESS P.O. Box 380 Bartlett

PHONE # 217-2513 / 374-6017

NO. OF SERVICE CONNECTIONS 26 DATE

SOURCES OF SUPPLY	REPORTED YIELD	DATE
	35 gpm	

TREATMENT PROVIDED

PUMPED OR GRAVITY FEED SYSTEM

DISTRIBUTION STORAGE	CAPACITY	ELEVATION

QUALITY OF RAW WATER

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

NAME Birch Hill East Carleton Water Co. LOCATION Conway

Robert Carleton EPA # C 051 2010

ADDRESS P.O. Box 218 Alton, NH

PHONE # 875-7000

NO. OF SERVICE CONNECTIONS 150 DATE

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Well # 1	12 gpm	6/87
Well # 2	25 gpm	6/87
Well # 3	15 gpm	6/87
Well # 4	25 gpm	6/87
Well # 5	10 gpm	6/87
Well # 6	23 gpm	6/87
	total 110	

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM pumped

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
6 press. steel tank	5,000 gal -ea	

QUALITY OF RAW WATER
High fluoride levels (2.6/3.15) mg/L.

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

NAME Birch Hill West. LOCATION Conway

Robert Carleton EPA # C 051 2020

ADDRESS P.O. Box 218 Alton, NH

PHONE # 875-7000

NO. OF SERVICE CONNECTIONS 45 DATE 6/87

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Well	137 gpm	

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM Pumped

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
Press. tank	10,000 gal	

QUALITY OF RAW WATER
Mn level = (0.22 mg/L)

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

NAME Birchview on Saco, Route 302 LOCATION Bartlett

Carlton Baco, RI EPA # C 016 2110

ADDRESS Local: Edward Holmes Box 377 Conway, NH

PHONE # 447-5354

NO. OF SERVICE CONNECTIONS 100 DATE 3/87

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Well # 1	65 gpm	3/87
Well # 2	22 gpm	3/87
Well # 3	18 gpm	3/87

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM 1/2 grar. fed, 1/2 pressure through pressure tank.

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
Steel atmos. tank	40,000 gal	
Steel Press. tank	6,120 gal	

QUALITY OF RAW WATER
Corrosive water

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS
Chalet used in winter, chalets built 25 years ago. Wells adjacent to Saco River, no protective radius. Jan/85 water rates: $120/year single unit.

NAME Black Mountain High Pastures LOCATION Jackson

Earle Wason EPA # C 121 2090

ADDRESS Deer Hill Road Chocorua, NH

PHONE # 323-7959

NO. OF SERVICE CONNECTIONS 10 DATE 2/89

SOURCES OF SUPPLY	REPORTED YIELD	DATE
1 well	47 gpm	2/89

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM gravity

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
4 steel atm. tanks	100 k (total)	
press. tank	385 gal. (Not installed as of 2/89)	

QUALITY OF RAW WATER
High Fl. level (4.7 mg/L)

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

NAME Black Mountain Meadow Condo. LOCATION Jackson

℅ Edward Keating EPA # C 121 2080

ADDRESS Jackson, NH

PHONE # 383-6765

NO. OF SERVICE CONNECTIONS 17 DATE 2/89

SOURCES OF SUPPLY	REPORTED YIELD	DATE
well # 1	13 gpm.	2/89

TREATMENT PROVIDED None.

PUMPED OR GRAVITY FEED SYSTEM gravity feed into tank

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
Steel Atm. tank	5k gal.	215 ft.
press. tank	5k gal.	

QUALITY OF RAW WATER

Fe = .895 mg/L

Mn = .11 mg/L

ABANDONED SITES (REASON/LOCATION)

1 abandoned well.

OTHER COMMENTS

NAME Blueberry Condominiums, Route 302 LOCATION Bartlett

Blueberry Mtn. Village EPA # C 016 2180

ADDRESS Joe Berry P.O. Box 826 North Conway, NH

PHONE # 374-2383/374-6622

NO. OF SERVICE CONNECTIONS 16 DATE 1972

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Well # 1	15 gpm	1972

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
Steel atm. tank	10,000 gal	
Steel press. tank	5,000 gal	

QUALITY OF RAW WATER
Adequate

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS
Well is located in parking lot, it is subject to volatile organic contamination or surface runoff. Tests have proved the water is safe up to now.

NAME Brook View Village LOCATION Conway

Property Owners Assn. EPA # C 051 2190

ADDRESS P.O. Box 283 Intervale, NH

PHONE # (603) 356-5760

NO. OF SERVICE CONNECTIONS 16 DATE 6/86

SOURCES OF SUPPLY	REPORTED YIELD	DATE
1 Well	23 gpm	12/87

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM Pumped

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
Steel Atm. tank	6,000 gal.	
Pressure tank	800 gal.	

QUALITY OF RAW WATER
Fluoride level 3.4 mg/L

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS
Portion of well's radius within White Mountain Nat'l. forest.
Alternate well in the vicinity of existing well.

NAME Cathedral Ledge LOCATION Conway

Alan Eliason EPA # C 051 2030

ADDRESS Sanctuary Homeowners Assoc. Inc. or Cathedral Ledge Village Association Box 203 Glenn NH

PHONE # _____

NO. OF SERVICE CONNECTIONS 55 DATE 1/87

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Well # 1	2 gpm	6/85
Well # 2	9 gpm	6/85

TREATMENT PROVIDED _____

PUMPED OR GRAVITY FEED SYSTEM _____

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
atmospheric tank	5,200 gal	
pressure tank	5,000 gal	

QUALITY OF RAW WATER

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS Monitoring Violations - Deforestation of System. Poor maintenance, legal Battle between homeowners and developers over who is responsible for system maintenance and who owns wells.

NAME Cathedral Trail Lodges I LOCATION Bartlett

Homeowners Assoc. EPA # C 016 2150

ADDRESS Joe Barry or Bob Kroger, Attitash Mtn Village Route 302, Bartlett, NH

PHONE # 374-6601

NO. OF SERVICE CONNECTIONS 48 DATE 7/87

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Well	36 gpm	7/87

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM Gravity flow combined with partial pressure storage

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
3 storage tanks-steel	26,000 gal	800 ft-887

QUALITY OF RAW WATER
Corrosive water

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

NAME Cathedral Trail II LOCATION Bartlett

Cathedral Trail Home Owners Assoc. EPA # C 016 2160

ADDRESS c/o Joe Berry Bartlett, NH

PHONE # 374-6622

NO. OF SERVICE CONNECTIONS 40 DATE 1978

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Well # 1	36 gpm	1977

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM Pumped

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
Atm. tank	8050 gal	
Press. tank	8050 gal	

QUALITY OF RAW WATER

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

NAME Cedar Creek LOCATION Conway

R Gribel Wason & Jones EPA # C 051 2200

ADDRESS P.O. Box 70 N. Conway, NH

PHONE # 356-9361

NO. OF SERVICE CONNECTIONS 42 DATE 12/88

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Well # 1	16 gpm	12/88
Well # 2	9.5 gpm	12/88

TREATMENT PROVIDED

PUMPED OR GRAVITY FEED SYSTEM

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
Atmospheric tank	15,000 gal.	
Hydropneumatic tank	2,100 gal.	

QUALITY OF RAW WATER
High fluoride, arsenic, manganese levels

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

NAME Christmas Mountain Condos LOCATION Bartlett

: Virginia Indelicato EPA # C 016 2220

ADDRESS P.O. Box 540 Glen, NH

PHONE # 383-9845 / 383-6866

NO. OF SERVICE CONNECTIONS 96 DATE 8/85

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Well # 1	20 gpm	8/85
Well # 2	20 gpm	8/85

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
Steel Atm. tank	20,000 gal	1080 ft

QUALITY OF RAW WATER
High bacteria results
Mn = .17 mg/L Fe = .5 mg/L

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS
Located behind Linderhoff Chalets type.
Still developing lots. Thayer suggests
tying into Judson or Lindenhalf.
Seasonal Development

NAME Cobb Farm LOCATION Bartlett

Lyman Garland, Home owner EPA # C 016 2140

ADDRESS P.O. Box 484 Bartlett or P.O. Box 27 Glen, NH 03838

PHONE # 374-2259

NO. OF SERVICE CONNECTIONS 28 DATE 7/89

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Well # 2	unknown	7/89

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM Pressure

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
Hydroneumatic tank	4,850 gal	

QUALITY OF RAW WATER

ABANDONED SITES (REASON/LOCATION)
Well # 1 is abandoned

OTHER COMMENTS
Inadequate system, pump house is subject to floods. System started in 1969

NAME Conway East LOCATION _____

Conway East Association EPA # C 0512040

ADDRESS _____

_____

PHONE # _____

NO. OF SERVICE CONNECTIONS 32 DATE _____

SOURCES OF SUPPLY	REPORTED YIELD	DATE
_____	12 gpm	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

TREATMENT PROVIDED _____

PUMPED OR GRAVITY FEED SYSTEM _____

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

QUALITY OF RAW WATER

_____

_____

ABANDONED SITES (REASON/LOCATION)

_____

_____

_____

OTHER COMMENTS

Not sure if this project was built

_____

_____

NAME Crawford Hill LOCATION Bartlett

Crawford Hill Association EPA # CO 162330

ADDRESS _____

PHONE # _____

NO. OF SERVICE CONNECTIONS 46 DATE _____

SOURCES OF SUPPLY	REPORTED YIELD	DATE
	50 gpm	

TREATMENT PROVIDED _____

PUMPED OR GRAVITY FEED SYSTEM _____

DISTRIBUTION STORAGE	CAPACITY	ELEVATION

QUALITY OF RAW WATER

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

No Information

NAME Crawford Hills LOCATION Bartlett

Edward Poliquin, Glen Builders, Francis Lyons, Jackson NH.
EPA # C 016 2190

ADDRESS Box 456 North Conway, NH

PHONE # 356-6767

NO. OF SERVICE CONNECTIONS 46 DATE 4/87

SOURCES OF SUPPLY	REPORTED YIELD	DATE
1 Well	26 gpm	4/87

TREATMENT PROVIDED

PUMPED OR GRAVITY FEED SYSTEM pumped to storage

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
Atmospheric steel tank	10,000 gal	
Pressure steel tank	2,225 gal	

QUALITY OF RAW WATER
Corrsoive water

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS
More room for development in this area - very flat.

NAME Davis Hill LOCATION Conway

HPR Development Group EPA # C 051 0020

ADDRESS James Durnwell, Hamel, Poliquin and Rice Development group

PHONE # _____

NO. OF SERVICE CONNECTIONS 170 DATE 3/89

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Well # 1	20 gpm	11/88
Well # 2	70 gpm	11/88

TREATMENT PROVIDED _____

PUMPED OR GRAVITY FEED SYSTEM _____

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
atmospheric tank	93,000 gal	

QUALITY OF RAW WATER
high in uranium - problem in wells levels > 10 pci/L

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS
May 17, 1989 NHDES to James Durnwell concerning posible interconnection of Davis Hill and Hunting Ridge Development (EPA # C 051206)

NAME Deerbrook Condominiums LOCATION Conway

Deerbrook Townhouse Assoc. EPA # C 051 2150

ADDRESS c/o Ted Sjogren Box 721 North Conway, NH

PHONE # _____

NO. OF SERVICE CONNECTIONS 16 DATE _____

SOURCES OF SUPPLY	REPORTED YIELD	DATE
1 Well	?	

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM _____

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
Atmospheric Tank	10,000 gal.	
Pressure	2,155	

QUALITY OF RAW WATER

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

NAME Eagle Mtn East LOCATION Jackson

CHP Partnership (Previous Owner) EPA # C 1210020

ADDRESS _____

_____

PHONE # _____

NO. OF SERVICE CONNECTIONS 40 DATE _____

SOURCES OF SUPPLY	REPORTED YIELD	DATE
2 wells	88 gpm	

TREATMENT PROVIDED _____

PUMPED OR GRAVITY FEED SYSTEM _____

DISTRIBUTION STORAGE	CAPACITY	ELEVATION

QUALITY OF RAW WATER

_____

_____

ABANDONED SITES (REASON/LOCATION)

_____

_____

_____

OTHER COMMENTS

Not sure if this supply was approved by NHDES

_____

_____

NAME Eagle Ridge Resort LOCATION Bartlett

Mr. Robert Leblanc, RJL Construction EPA # C 016 0010

ADDRESS P.O. Box 613 Intervale, NH 03845

PHONE # (207) 452-2344

NO. OF SERVICE CONNECTIONS 120 DATE 8/30/88

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Well # 1	20 gpm	10/88
Well # 2	5 gpm	10/88
Well # 3	37.5 gpm	10/88

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM Gravity system & Pressure system

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
Atm. tank	30,000 gal	900 ft.
Pressure tank	3,000 gal	

QUALITY OF RAW WATER

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

From letter dated Sep/88: Developer originally wanted to hook up with Lower Bartlett but water precinct wanted $2000 permit fee then to put 1/2 mile of 8 in. pipe to water system and install pumping station. He decided to install 200 k on site water system instead. Also lower Bartlett system inadequate because of Water Storage & supply crisis.

NAME Echo Lake Woods LOCATION Conway

Robert DeMers EPA # C 051 2050

ADDRESS P.O. Box 401 RFD 1, Canton ME 04221

PHONE # (207) 597-2385

NO. OF SERVICE CONNECTIONS 52 DATE 4/89

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Well # 1	25 gpm	11/87
Well # 2	22 gpm	

TREATMENT PROVIDED none

PUMPED OR GRAVITY FEED SYSTEM

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
Atmospheric tank	16,000 gal	
pressure tank	5,000 gal	

QUALITY OF RAW WATER
High Fe. and High Fl. levels

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS
To be operated as part of Water Utility Franchise Owned by Mr. DeMers with New Hampshire Woodlawn Grove in conway, Rolling Ridge in Bartlett
Customers charge of $ 150/year 4/89

NAME Ellis River Village LOCATION Jackson

William E. Rice EPA # C 121 2060

ADDRESS Box 249 Jackson, NH

PHONE # 383-9276

NO. OF SERVICE CONNECTIONS 8 DATE 3/89

SOURCES OF SUPPLY	REPORTED YIELD	DATE
1 well	25 gpm	

TREATMENT PROVIDED none.

PUMPED OR GRAVITY FEED SYSTEM pumped

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
1 steel atm tank	4k gal.	
steel press tank	1k gal.	

QUALITY OF RAW WATER

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

NAME Forest Edge LOCATION Conway

Forest Edge c/o Joseph Sullivan EPA # C 051 2060

ADDRESS P.O. Box 830 No. Conway, NH

PHONE # 356-5600

NO. OF SERVICE CONNECTIONS 77 DATE 1/89

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Well # 1	5 gpm	1/89
Well # 2	8 gpm	1/89
Well # 3	12 gpm	1/89

TREATMENT PROVIDED no treatment

PUMPED OR GRAVITY FEED SYSTEM

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
Atmospheric tank	16,000 gal	660 ft.
Hydropneumatic tank	4,850 gal	

QUALITY OF RAW WATER

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

NAME Forest Park Village LOCATION Conway

Joseph Sullivan c/o Forest Park Village EPA # C 051 2070

ADDRESS P.O. Box 830 North Conway, NH 03860

PHONE # 356-5600

NO. OF SERVICE CONNECTIONS 26 DATE 9/87

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Well # 1	20 gpm	9/87

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
Atmospheric Tank	10,000 gal	
Pressure Tank # 1	100 gal	
Pressure Tank # 2	40 gal	

QUALITY OF RAW WATER
High Fluoride levels

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

NAME Four Seasons at Attitash LOCATION Bartlett

Mr. Henry Shaw, Mtn High Dev. Corps EPA # C 016 2240

ADDRESS P.O. Box 398 Bartlett, NH

PHONE # 356-9484

NO. OF SERVICE CONNECTIONS 176 DATE 4/87

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Well # 1	65 gpm	6/85
Well # 2	65 gpm	6/85

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
Steel-Atm. tank	50,000 gal	
Steel Press. tank	8,000 gal	

QUALITY OF RAW WATER
High fluoride and iron levels

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

NAME Glen Acres LOCATION Bartlett

Edward Poliquin EPA # C 016 2060

ADDRESS Rt. 16 Box 456 North Conway, NH 03860

PHONE #

NO. OF SERVICE CONNECTIONS 17 DATE 4/87

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Well # 1	4 gpm	3/89
Well # 2	4.5 gpm	3/89

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM Pumped

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
Steel atm tank	5000 gal	
Pressure tank	900 gal	

QUALITY OF RAW WATER

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

Protective 200 ' radius around the wells occupied with some residence and septic systems. DES allowes pumping provided the quality of water continues to be tested.

NAME Goodrich LOCATION Bartlett

Michael Lynn, Goodrich Joint Venture EPA # C 016 2350

ADDRESS First Ledge Rd. Intervale, NH Box 126

PHONE # 356-3116

NO. OF SERVICE CONNECTIONS 100 DATE 9/88

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Well # 1	86 gpm	7/88
Well # 2	69 gpm	2/88

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM Gravity feed

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
Atm. steel tank	24,000 gal	825

QUALITY OF RAW WATER

Fluoride level 2.9 mg/L

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

NAME Goodrich Falls Water Co. LOCATION Bartlett

Doris Chadbourne EPA # C 016 1030

ADDRESS P.O. Box 216 Glen, NH

PHONE # 383-9689

NO. OF SERVICE CONNECTIONS 16 DATE 4/83

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Well # 1	25 gpm	10/81

TREATMENT PROVIDED

PUMPED OR GRAVITY FEED SYSTEM

DISTRIBUTION STORAGE	CAPACITY	ELEVATION

QUALITY OF RAW WATER

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

NAME Hemlock Hills or Deerpath Village LOCATION Conway

Repr: Edward Keating Jr. EPA # C 051 0010

ADDRESS P.O. Box 1706 Duxbury, MA 02331

PHONE # (617) 934-0188

NO. OF SERVICE CONNECTIONS 47 DATE 5/89

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Well # 1	9 gpm	5/89
Well # 2	6 gpm;to be closed	
Well # 3	40 gpm	

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
atm. steel tank.	15,000 gal	
	500 gal	

QUALITY OF RAW WATER

ABANDONED SITES (REASON/LOCATION)
Well #2: due to high Fe. Levels

OTHER COMMENTS

NAME Holiday Ridge LOCATION Bartlett

Mr. Karl Hydren EPA # C 016 2010

ADDRESS P.O. Box 156 Intervale, NH

PHONE # 356-2203

NO. OF SERVICE CONNECTIONS 50 DATE 9/87

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Well # 1	100 gpm	7/87
Well # 2	150 gpm	9/87

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM Pumped

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
Atm. concrete tank	5000 gal	
Pressure steel tank	1,100 gal	
Pressure steel tank	1,100 gal	

QUALITY OF RAW WATER

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

Leach Field 190 ft. from well

Water Rate Jan 83 $155/year

Water shut off periodically in 1982/1983 due to leaks in system leaving residence without water for days.

NAME Hunting Ridge LOCATION Conway

c/o Joseph Jalbert EPA # C 051 2080

ADDRESS P.O. Box 94 Ceter Conway, NH 03013

PHONE # _____

NO. OF SERVICE CONNECTIONS 65 DATE 10/87

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Well # 2	120 gpm	10/87
Well # 3	60 gpm	10/87

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM _____

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
Atmospheric tank	20,000 gal	
Pressure tank	2,800 gal	

QUALITY OF RAW WATER

ABANDONED SITES (REASON/LOCATION)
Well # 1 (Possibly because of closeness to Route 302)

OTHER COMMENTS

NAME Jeferson/Madison LOCATION _____

Dame Place Association EPA # C 121205

ADDRESS _____

PHONE # _____

NO. OF SERVICE CONNECTIONS 30 DATE _____

SOURCES OF SUPPLY	REPORTED YIELD	DATE
	130 gpm	

TREATMENT PROVIDED _____

PUMPED OR GRAVITY FEED SYSTEM _____

DISTRIBUTION STORAGE	CAPACITY	ELEVATION

QUALITY OF RAW WATER

_____

ABANDONED SITES (REASON/LOCATION)

_____

OTHER COMMENTS

No information

NAME Kearsarge Estates LOCATION Bartlett

David Van Note EPA # C 016 2360

ADDRESS Box 415 Kearsarge, NH 03847

PHONE # (603) 356-5062

NO. OF SERVICE CONNECTIONS 15 DATE 1997

SOURCES OF SUPPLY	REPORTED YIELD	DATE
	20 gpm	

TREATMENT PROVIDED

PUMPED OR GRAVITY FEED SYSTEM

DISTRIBUTION STORAGE	CAPACITY	ELEVATION

QUALITY OF RAW WATER
Fl: 4.15 mg/L

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

NAME Lake Pine Condos LOCATION _____

Lake Pine Condo Association EPA # C 0512090

ADDRESS _____

_____

PHONE # _____

NO. OF SERVICE CONNECTIONS 14 DATE _____

SOURCES OF SUPPLY	REPORTED YIELD	DATE
_____	20 (guess) gpm	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

TREATMENT PROVIDED _____

PUMPED OR GRAVITY FEED SYSTEM _____

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

QUALITY OF RAW WATER

_____

_____

ABANDONED SITES (REASON/LOCATION)

_____

_____

_____

OTHER COMMENTS

Is this a public supply?

_____

_____

NAME Linderhof Golf Course LOCATION Bartlett

William O'Rourke EPA # C 016 2070

ADDRESS P.O. Box 122 Glen, NH

PHONE # 383-9442

NO. OF SERVICE CONNECTIONS 119 DATE 5/89

SOURCES OF SUPPLY	REPORTED YIELD	DATE
BRW # 1	40 gpm	5/89
BRW # 1	50 gpm	

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
1 atm. storage tank	10,000 gal	
1 press. tank	10,700 gal	

QUALITY OF RAW WATER

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

Condo. development with Golf Course - Wells in Golf Course

NAME Linderhof Mountainside LOCATION Bartlett

William O'Rourke EPA # C 016 2090

ADDRESS P.O. Box 122 Glen, NH

PHONE #

NO. OF SERVICE CONNECTIONS 231 DATE 7/89

SOURCES OF SUPPLY	REPORTED YIELD	DATE
BR Well # 2	25 gpm	7/89
BR Well # 4	6 gpm	7/89
BR Well # 5	30 gpm	7/89
BR Well # 6	80 gpm	7/89

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM Pressure

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
Atmospheric Tank	30,000 gal	
Hydropnewmatic Tank	3,395 gal	

QUALITY OF RAW WATER

ABANDONED SITES (REASON/LOCATION)
BRW # 1 is abandoned
BRW # 3 is abandoned

OTHER COMMENTS Off Route 302 Single family Units supply by its own System Thayer suggests connecting Linderhoff I and II or tying into Judeson system.

NAME The Meadows LOCATION Bartlett

The Meadows Property Assoc. c/o Mr. Burt EPA # C 016 2370

ADDRESS West side Rd. Box 244 Glen, NH

PHONE # 383-9790

NO. OF SERVICE CONNECTIONS 14 DATE 4/88

SOURCES OF SUPPLY	REPORTED YIELD	DATE
1 well	25 gpm	9/88

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
Atm tank steel	Unknown	
Pressure tank steel	950 gal	

QUALITY OF RAW WATER

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

NAME Melody Pines Condominium LOCATION Conway

℄ Condos East Corporation EPA # C 051 2230

ADDRESS Bertha Swan P.O. 601 Lincoln, NH 03251

PHONE # 447-6326

NO. OF SERVICE CONNECTIONS 50 DATE 4/87

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Well # 1	9 gpm	4/87
Well # 2	13 gpm	4/87

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
Steel atmospheric tank	15,000 gal	
Hydropneumatic tank	2,500 gal	

QUALITY OF RAW WATER
High Fluoride

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

NAME Mount Attitash Associates LOCATION Bartlett

Attitash Enterprises Inc. EPA # C 016 2080

ADDRESS c/o Charles Peter Pinkham

PHONE # 374-2386

NO. OF SERVICE CONNECTIONS 18 DATE

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Well	300 gpm	

TREATMENT PROVIDED

PUMPED OR GRAVITY FEED SYSTEM

DISTRIBUTION STORAGE	CAPACITY	ELEVATION

QUALITY OF RAW WATER

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

NAME Mountain Vale Village M.H.P. LOCATION Conway

Al Lattanzio EPA # C 051 3100

ADDRESS 17 Mountain Vale Village Center-Conway, NH

PHONE # 356-5887

NO. OF SERVICE CONNECTIONS 145 DATE 9/89

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Well # 1	353 gpm	9/87
Well # 2	40 gpm	

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
Atm. steel tank	30 k gal.	
press. tank	7,300 gal	

QUALITY OF RAW WATER

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

NAME Mountainside at Attitash LOCATION Bartlett

North 6 Real Estate EPA # C 016 2210

ADDRESS Intervale, NH 03841

PHONE # 356-3590

NO. OF SERVICE CONNECTIONS 60 DATE 6/89

SOURCES OF SUPPLY	REPORTED YIELD	DATE
BRW # 1	25 gpm	6/89
BRW # 2	UKN	6/89

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
2 Atm. tanks	6,000&4,000 gal	
2 Press. tanks	2,170 gal	

QUALITY OF RAW WATER

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS
Next to ski area trails from ski mountain loop by development. Town Houses $220,000 and up.

NAME Nordic Village I LOCATION Bartlett

Robert Cyr EPA # C 016 2270

ADDRESS Route 16 Jackson, NH 03846

PHONE # 383-9306/383-9101/383-4265

NO. OF SERVICE CONNECTIONS 143 DATE 10/85

SOURCES OF SUPPLY	REPORTED YIELD	DATE
BRW # 1	89 gpm	4/86
BRW # 2	10 gpm	5/86

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
3 atm. steel tank	10,000 gal ea.	
3 press. tank	2,000 gal ea.	

QUALITY OF RAW WATER
High Mn & Fl levels

ABANDONED SITES (REASON/LOCATION)
One abandoned well

OTHER COMMENTS

NAME North Ledge Home Owners Assoc. LOCATION Bartlett

North Ledge Home Owners Assoc. c/o David Fox

EAP # C 016 2020

ADDRESS North Ledge Rd. Box AA Jackson, NH

PHONE # 374-6982

NO. OF SERVICE CONNECTIONS 32 DATE 9/89

SOURCES OF SUPPLY	REPORTED YIELD	DATE
1 Well	20 gpm	4/89

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM Pumped

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
Hydropneumatic tank	3,590 gal	
Tank	10,100 gal	
Tank	10,100 gal	

QUALITY OF RAW WATER

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

Sanitary Survey states that storage tanks have not seen built as of 4/89.

Needs 1 more well to meet state regulation

North Pines Association LOCATION _____

OWNER _____ EPA # C 051 2110

ADDRESS _____

_____

PHONE # _____

NO. OF SERVICE CONNECTIONS 29 DATE _____

SOURCES OF SUPPLY	REPORTED YIELD	DATE
_____	_____	_____
_____	60 gpm	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

TREATMENT PROVIDED _____

PUMPED OR GRAVITY FEED SYSTEM _____

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

QUALITY OF RAW WATER

_____

_____

ABANDONED SITES (REASON/LOCATION)

_____

_____

_____

OTHER COMMENTS

No Information

_____

_____

NAME Near Ledge LOCATION Conway

: Eben Marsh EPA # C 051 2210

ADDRESS Berry Hill road Denmark, ME

PHONE # 356-3298 (207) 647-8190

NO. OF SERVICE CONNECTIONS 25 DATE 4/86

SOURCES OF SUPPLY	REPORTED YIELD	DATE	ELEVATION
Well	55 gpm	4/88	480 ft.

TREATMENT PROVIDED None.

PUMPED OR GRAVITY FEED SYSTEM Pumped

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
Steel atm. tank		505 ft.
Press. tank	1,000	

QUALITY OF RAW WATER
Adequate

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

NAME Oak Wood Heights LOCATION _____

MACPON Association EPA # C 0512170

ADDRESS _____

_____

PHONE # _____

NO. OF SERVICE CONNECTIONS 63 DATE _____

SOURCES OF SUPPLY	REPORTED YIELD	DATE
_____	30 gpm	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

TREATMENT PROVIDED _____

PUMPED OR GRAVITY FEED SYSTEM _____

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

QUALITY OF RAW WATER

_____

_____

ABANDONED SITES (REASON/LOCATION)

_____

_____

_____

OTHER COMMENTS

_____ _____

_____

_____

NAME Old Mill Estates LOCATION Conway

Glen Builders, Inc. EPA # C 051 2160

ADDRESS Route 16, P.O. Box 456 North Conway, NH

PHONE # 356-3401

NO. OF SERVICE CONNECTIONS 60 DATE 4/87

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Well # 1	40 gpm	4/87
Well # 2	36 gpm	4/87

TREATMENT PROVIDED

PUMPED OR GRAVITY FEED SYSTEM

DISTRIBUTION STORAGE	CAPACITY	ELEVATION

QUALITY OF RAW WATER

Fluoride = 4.0 mg/L

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

NAME Partridge Woods LOCATION Bartlett

Edward Keating EPA # C 016 2230

ADDRESS 22 Depot St. P.O. Box 1706 Duxbury, MA

PHONE # 934-0105

NO. OF SERVICE CONNECTIONS 48 DATE 4/87

SOURCES OF SUPPLY	REPORTED YIELD	DATE
BRW # 1	60 gpm	4/87

TREATMENT PROVIDED

PUMPED OR GRAVITY FEED SYSTEM

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
Steel Atm. tank	12,600 gal	
Steel Press. tank	2,200 gal	

QUALITY OF RAW WATER

Adequate. Mn level: 0.32 mg/L

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

NAME Pine Glen LOCATION Bartlett

Pine Glen Homeowners Assoc. EPA # C 016 2320

ADDRESS P.O. Box 504 Glen, NH 03838

PHONE # 356-2621

NO. OF SERVICE CONNECTIONS 20 DATE 4/86

SOURCES OF SUPPLY	REPORTED YIELD	DATE
1 Well	61 gpm	5/86

TREATMENT PROVIDED

PUMPED OR GRAVITY FEED SYSTEM Pumped

DISTRIBUTION STORAGE	CAPACITY	ELEVATION

QUALITY OF RAW WATER

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

Well does not have 200 ft radius for protection, adjacent to river. This development may have been connected to the Bartlett Place and Attitash properties Water Supply?

NAME River Bend Subdivision LOCATION Bartlett

River Bend property, c/o Gary Culp EPA # C 016 2100

ADDRESS Box 291 Jackson, NH

PHONE # 383-9477

NO. OF SERVICE CONNECTIONS 15 DATE 4/87

SOURCES OF SUPPLY	REPORTED YIELD	DATE
1 Well	7 - 8 gpm	8/87

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
Atmospheric tank	400 gal	
pressure tank		

QUALITY OF RAW WATER

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

Septic System within 200 ft protective radius of well

NAME River Run Motel & Condominiums LOCATION Bartlett

Joseph Berry EPA # C 016 2170

ADDRESS P.O. Box 826 North Conway, NH

PHONE # 356-6847/374-2386

NO. OF SERVICE CONNECTIONS 150 ~~150~~ 7 DATE 6/87

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Well # 1	120 gpm	1/87
Well # 2	120 gpm	6/87

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM Pump

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
Steel atm. tank	15,000 gal	
Press. tank (old)	5,200 gal	
Press. tank (new)	3,400 gal	

QUALITY OF RAW WATER
1 Well has high Fe & Mn levels, mixing with other high producing wells' water, lowers these levels to acceptable standards.

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS
Time shared units. Access from this development is Attitash Ski Mtn.

NAME Rocky River Resort LOCATION Bartlett

Charles Russo EPA # C 016 2290

ADDRESS Box 152 Glen, NH

PHONE # 383-9542

NO. OF SERVICE CONNECTIONS 40 DATE 3/87

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Well	16 gpm	3/87

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
Atm. Tank	20,000 gal	
Press. Tank	3,000 gal	

QUALITY OF RAW WATER
Fl. level = 3.7

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS
Low Cost Condos 109 - 130K completed building
field trip 7/12/84 Red Apple Inn connected to system

NAME Rolling Ridge LOCATION Bartlett

Robert A. DeMers EPA # C 016 2130

ADDRESS RFD 1, Box 401 Canton, ME

PHONE # 597-2385

NO. OF SERVICE CONNECTIONS 29 DATE 11/87

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Well	50 gpm	11/87

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM Pumped

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
Steel atm tank	5,000 gal	900 ft.
2 Steel press. tanks	175 gal	

QUALITY OF RAW WATER
High fl levels

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS
Active landfill (3/4 miles away. System dows not have the 200' radius protection (5/89). Needs an above ground pump-station.

NAME Saco Pines Condominiums LOCATION Conway

: George Arsenault EPA # C 051 2180

ADDRESS RR # 1 Box 76 Lovell, ME 04051

PHONE # (207) 925-3813

NO. OF SERVICE CONNECTIONS 20 DATE 4/88

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Well	27 gpm	4/88

TREATMENT PROVIDED None: Fe & Mn treatment required

PUMPED OR GRAVITY FEED SYSTEM

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
Steel atm. tank	5,000 gal	
Press. tank	1,000 gal	

QUALITY OF RAW WATER
Fe = .80 mg/L Mn=2.4 mg/L (1.51 mg/L in 4/88)

iron + Mn treatment required

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

NAME Saco Ridge Village LOCATION Bartlett

David Eliason EPA # C 016 2020

ADDRESS Box 537 Glen, NH

PHONE # 374-2322

NO. OF SERVICE CONNECTIONS 26 DATE 4/87

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Well # 1	50 gpm	4/87
Well # 2	50 gpm	

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM Pumped

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
2 Steel atm. tank	5000 gal ea	
1 Steel press. tank	150 gal	

QUALITY OF RAW WATER

Coliform bacteria in samples exceeded 1/100 ml.

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

Letter from May/84 requested to relocate well to a better location. Neither well has protective ~~cover~~ cover. Wells located at lowest grade in pump houses carry all dirt and backwash drained into wells. Well area too close to brook that overflows regularly contaminating the wells

NAME Saco River Forest Assn. LOCATION Conway

Lot owners Assn. EPA # C 051 2120

ADDRESS P.O. Box 2101 Conway, NH

PHONE # 447-5467

NO. OF SERVICE CONNECTIONS 20 DATE 10/86

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Well # 1	18 gpm	10/86

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM Pumped

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
Press. tank	1000 gal.	

QUALITY OF RAW WATER

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS Monitoring failure

NAME SACO Woods LOCATION Conway

North East Community Development EPA # C 0512250

ADDRESS _____

PHONE # _____

NO. OF SERVICE CONNECTIONS 90 DATE _____

SOURCES OF SUPPLY	REPORTED YIELD	DATE
	78 gpm	

TREATMENT PROVIDED _____

PUMPED OR GRAVITY FEED SYSTEM _____

DISTRIBUTION STORAGE	CAPACITY	ELEVATION

QUALITY OF RAW WATER

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

No Information

NAME South Pines Association LOCATION Conway

-- Henry Foley EPA # C 051 2140

ADDRESS 20 Fairlane Ave Nashua, NH

PHONE # 883-6888

NO. OF SERVICE CONNECTIONS 28 DATE 8/87

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Artesian Well	50 gpm	

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
2 tanks	(?) 400 gal.	442 ft.

QUALITY OF RAW WATER
Fluoride level 2.8 mg/L.

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS
No protective radius

NAME Spruce Mountain LOCATION Jackson

Fairfield Group Lmt. EPA # C 121 2120

ADDRESS P.O. Box 749 Jackson, NH 03846

PHONE #

NO. OF SERVICE CONNECTIONS 60 DATE 8/85

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Well	50 gpm	July/85

TREATMENT PROVIDED

PUMPED OR GRAVITY FEED SYSTEM

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
		1285 feet

QUALITY OF RAW WATER

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

NAME Stillings Grant LOCATION Bartlett

(Cate Mntn Associates EPA # C 016 0050

ADDRESS _____

PHONE # _____

NO. OF SERVICE CONNECTIONS 262 DATE _____

SOURCES OF SUPPLY	REPORTED YIELD	DATE
4 wells	200 gpm	

TREATMENT PROVIDED Gravity Fed.

PUMPED OR GRAVITY FEED SYSTEM _____

DISTRIBUTION STORAGE	CAPACITY	ELEVATION

QUALITY OF RAW WATER

_____

ABANDONED SITES (REASON/LOCATION)

_____

OTHER COMMENTS

Approved private system - on flat piece of land being developed by Mr. Poliquin - site adjacent to Lower Bartlett Water Precinct.

NAME Top Notch Condos LOCATION Bartlett

Ed Astrachan EPA # C 016 2200

ADDRESS Route 16 Bartlett, NH

PHONE # 356-3887

NO. OF SERVICE CONNECTIONS 36 DATE 2/85

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Well	33 gpm	
Well	30 gpm	

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM Pumped to storage

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
Steel atm. tank	10,000 gal	
Steel press. tank	2,170 gal	

QUALITY OF RAW WATER
High Fe. Mn. levels

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS
Plans to add its system to the public water system of Cathedral Trail Development. Unscreen line into atm tank allows passage of small animals.

NAME Tyrol Development LOCATION Jackson

K. French EPA # C 121 2020

ADDRESS P.O. Box 158 Jackson, NH

PHONE # 383-9546

NO. OF SERVICE CONNECTIONS 12 DATE 12/79

SOURCES OF SUPPLY	REPORTED YIELD	DATE
1 well.	36 gpm.	

TREATMENT PROVIDED

PUMPED OR GRAVITY FEED SYSTEM

DISTRIBUTION STORAGE	CAPACITY	ELEVATION

QUALITY OF RAW WATER
Mn Level 0.46 mg/L

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

NAME Villagio Bianco Ass. Ltd. LOCATION Bartlett

Robert Cantarano EPA # C 016 2260

ADDRESS P.O. Box 544 Intervale, NH

PHONE # 356-5952

NO. OF SERVICE CONNECTIONS 15 DATE 8/87

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Well	29 gpm	8/85

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM Pumps to storage

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
Steel atm. tank	8,000 gal	855 ft.
Steel press. tank	600 gal	

QUALITY OF RAW WATER

High Fe. level. pH. of 5.9
potential to contamination

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

NAME Wildcat Condominiums LOCATION Jackson

Eng-Chye Low EPA # C 121 2030

ADDRESS Box L Jackson, NH

PHONE # 383-6822

NO. OF SERVICE CONNECTIONS 28 DATE

SOURCES OF SUPPLY	REPORTED YIELD	DATE
1 well	12 gpm.	4/81

TREATMENT PROVIDED

PUMPED OR GRAVITY FEED SYSTEM

DISTRIBUTION STORAGE	CAPACITY	ELEVATION

QUALITY OF RAW WATER
Fe = 1.3 mg/L

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

NAME Wispering Brook - Glen Builders LOCATION Bartlett

Robert Letoile EPA # C 016 2310

ADDRESS Box 12 North Conway, NH

PHONE # 356-2621

NO. OF SERVICE CONNECTIONS 12 DATE 4/89

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Well	30 gpm	4/89

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM Gravity fed into tank

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
Steel atm. tank	4,000 gal	
Steel press. tank	1,000 gal	

QUALITY OF RAW WATER

Mn: .09 mg/L Fl: 2.8 mg/L

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

NAME Woodland Grove LOCATION Conway

Robert A. DeMers EPA # C 051 2130

ADDRESS RFD 1, Box 401 Canton, ME

PHONE # 597-2385

NO. OF SERVICE CONNECITONS 59 DATE 8/87

SOURCES OF SUPPLY	REPORTED YIELD	DATE
Well # 1	22 gpm	8/87
Well # 2	20 gpm	not in use at this time

TREATMENT PROVIDED None

PUMPED OR GRAVITY FEED SYSTEM

DISTRIBUTION STORAGE	CAPACITY	ELEVATION
Atm. tank	10,000 gal.	
Press. tank	3,300 gal.	

QUALITY OF RAW WATER

ABANDONED SITES (REASON/LOCATION)

OTHER COMMENTS

APPENDIX B
Bartlett Village Fire Precinct

BARTLETT VILLAGE FIRE PRECINCT WORKSHEET CALCULATIONS

EXISTING CONDITIONS	# of service conn.	Estimated Ave Day Demand (kgal/d)	Reported Yield (kgal/d)	Estimated Elev. of service area (ft. NGVD)	Reported Storage
Bartlett Village Fire Prec.	250	not avail	not avail	680	1 mg supply reservoir

SMALL SYSTEMS Map#/System Name (1)	EPA #	# of units approved	Calc.(2) Ave Day Demand (kgal/d)	Reported Well Capacity (kgal/d)	Estimated Elevation of system (ft. NGVD)	Estimated dist pipe length (ft.)
AREA WEST OF BARTLETT VILLAGE FIRE PRECINCT						
2. Stillings Grant	C0160050	262	98.3	288.0	720	2000
14.Cobb Farm	C0162140	28	10.5	na	760	9000
Subtotal		290	109	288		11000
AREA EAST OF BARTLETT VILLAGE FIRE PRECINCT						
5. Saco Ridge	C0162020	26	9.8	144.0	700	2000
9. Mt.Attitash	C0162080	18	6.8	432.0	1000	1000
12.Birchview on Saco	C0162110	100	37.5	151.0	600	1000
13.Rolling Ridge	C0162130	29	10.9	72.0	900	3000
15.Cathedral Trail I	C0162150	48	18.0	51.0	1000	1000
16.Cathedral Trail II	C0162160	40	15.0	51.0	1200	Pipe to No.15
17.River Run	C0162170	152	57.0	345.0	600	2000
18.Blueberry Condos	C0162180	16	6.0	21.6	800	2000
19.Crawford Hill	C0162190	46	17.3	37.0	740	3000
20.Top Notch	C0162200	36	13.5	90.0	900	1000
21.Mt.Side/Attitash	C0162210	60	22.5	36.0	900	2000
24.Four Seasons/Attit	C0162240	176	66.0	187.2	620	1000
25.Bartlett Place	C0162250	61	22.9	122.4	600	500
28.Rocky River	C0162290	40	15.0	23.0	600	500
29.Attitash Woods	C0162300	54	20.3	129.6	700	1000
32.Crawford Pond	C0162330	46	17.3	72.0	700	3000
33.Bear Village South	C0162340	26	9.8	50.0	760	1500
36.The Meadows	C0162370	14	5.3	36.0	600	4500
Subtotal:	20	988	371	2051		30000
transmission main along Route 302						25000

EXISTING DEMAND IN PRECINCT=	not avail	
CALC. ADDITIONAL DEMAND=	479	(kgal/d)
EXISTING SUPPLY IN PRECINCT =	not avail	(kgal/d)
ADD WATER SUPPLY=	479	(kgal/d)

(1) Data was obtained from NH DES DWS files
(2) Based on (# of units x 2.5 bedrooms/unit x150 = gpd)

```
MAPS VERSION 26 JAN 87
INITIALIZE OR RESTORE?
INPUT MAPS COMMAND
ECONOMIC DATA GOES HERE

INPUT ECONOMIC DATA
DATA PUT AT    6
INPUT MAPS COMMAND
TITL IS INAPPROPRIATE COMMAND-TRY AGAIN
INPUT MAPS COMMAND
DATA FOR STORAGE TANK    1
INPUT STORAGE TANK DATA
DATA PUT AT    8
INPUT MAPS COMMAND
CONSTRUCT STORAGE TANK    1
DATA PUT AT    8



STORAGE TANK OUTPUT MOD    1
STORAGE TANK MOD  1



VOLUME                                    0.500E+00 MG
CONCRETE TANK                             0.340E+06 $

ECONOMIC FACTORS
DESIGN LIFE                                 30  YEARS
YEAR BUILT                                  1990
ENR INDEX                                 0.473E+04
INTEREST RATE                             9.25 PERCENT
INFLATION RATE                            0.00 PERCENT
CITY MULTIPLIER                           0.100E+01
O&M WAGE RATE                             0.200E+02 $/HR

    COST SUMMARY
              COST IN 1990  COST IN 1990  COST IN 1990
              DOLLARS       DOLLARS       DOLLARS
              BUILT IN 1990 BUILT IN 1990 BUILT IN 1990
                                          W/ 0.0% INFLATION
```

CONSTRUCTION($)	0.340E+06	0.340E+06	0.340E+06
INDIRECT CONS($)	0.849E+05	0.849E+05	0.849E+05
CAPITAL COST($)	0.425E+06	0.425E+06	0.425E+06
AMORTIZED($/YR)	0.423E+05	0.423E+05	0.423E+05
LABOR COST($/YR)	0.000E+00	0.000E+00	0.000E+00
SUPPLY COST($/YR)	0.000E+00	0.000E+00	0.000E+00
POWER($/YR)	0.000E+00	0.000E+00	0.000E+00
TOTAL O&M($/YR)	0.340E+04	0.340E+04	0.340E+04
AVE ANNUAL($/YR)	0.457E+05	0.457E+05	0.457E+05

****

INPUT MAPS COMMAND
DESIGN DATA FOR FORCE MAIN 1

INPUT FORCE MAIN DATA
DATA PUT AT 10
INPUT MAPS COMMAND
DESIGN DATA FOR PUMP 1
INPUT PUMP DATA
DATA PUT AT 12
INPUT MAPS COMMAND
CONSTRUCT FORCE MAIN 1
DATA PUT AT 10
CONSTRUCT PUMP 1
DATA PUT AT 12

PIPE LINE WITH FORCE MOD 1
AND PIPE MOD 1
DETAILED OUTPUT, SUMMARY OR END?

OUTPUT FOR FORCE MAIN NO 1

AREA EAST OF BVFP

MAXIMUM FLOW- STAGE 1	0.556E+00 MGD
AVERAGE FLOW- STAGE 1	0.371E+00 MGD
LENGTH	0.250E+05 FT
LENGTH	0.473E+01 MI
INITIAL ELEVATION	0.680E+03 FT
INITIAL PRESSURE HEAD	0.138E+03 FT
FINAL ELEVATION	0.120E+04 FT
FINAL PRESSURE HEAD	0.138E+03 FT
ROUGHNESS HEIGHT	0.400E-03 FT
ALLOWABLE PRESSURE IN PIPE	0.400E+03 FT
RECTANGULAR TRENCH	
DEPTH OF COVER	0.300E+01 FT
DRY SOIL CONDITIONS	
TYPE OF PIPE	
DUCTILE IRON PIPE IS USED FOR ALL DIAMETERS	

HYDRAULIC ANALYSIS AT PEAK FLOW (FIRST STAGE)
0.860 CFS 0.556 MGD

DIAM (IN)	VELOCITY (FPS)	VELOCITY HEAD (FT)	MINOR LOSSES (FT)	FRICTION LOSSES (FT)	HEAD REQUIRED (FT)
6.0	0.438E+01	0.298E+00	0.000E+00	0.329E+03	0.849E+03
8.0	0.246E+01	0.944E-01	0.000E+00	0.773E+02	0.597E+03
10.0	0.158E+01	0.387E-01	0.000E+00	0.254E+02	0.545E+03
12.0	0.110E+01	0.186E-01	0.000E+00	0.103E+02	0.530E+03

HYDRAULIC ANALYSIS AT AVERAGE FLOW (FIRST STAGE)
0.574 CFS 0.371 MGD

DIAM (IN)	VELOCITY (FPS)	VELOCITY HEAD (FT)	MINOR LOSSES (FT)	FRICTION LOSSES (FT)	HEAD REQUIRED (FT)
6.0	0.292E+01	0.133E+00	0.000E+00	0.152E+03	0.672E+03
8.0	0.164E+01	0.420E-01	0.000E+00	0.361E+02	0.556E+03
10.0	0.105E+01	0.172E-01	0.000E+00	0.120E+02	0.532E+03
12.0	0.731E+00	0.830E-02	0.000E+00	0.490E+01	0.525E+03

NO SECOND STAGE

CONSTRUCTION YEAR-STAGE 1	1990	
INTEREST RATE	9.250	%
DESIGN LIFE	30	YEARS
ENR CONSTRUCTION INDEX	4735.0	
LAND COST	0.000E+00	$
CITY MULTIPLIER	1.000	
TERRAIN TYPE--		

DIAM (IN)	PIPE COSTS ($)	OTHER COSTS ($)	CONSTRUCTION COSTS ($)	OVERHEAD COSTS ($)	OPERATION & MAINT. ($/YR)
6.0	0.3714E+06	0.9927E+05	0.4706E+06	0.1177E+06	0.2212E+04
8.0	0.4945E+06	0.1276E+06	0.6221E+06	0.1555E+06	0.2487E+04
10.0	0.6176E+06	0.1561E+06	0.7737E+06	0.1934E+06	0.2766E+04
12.0	0.7406E+06	0.1848E+06	0.9254E+06	0.2313E+06	0.3048E+04

FORCE MAIN COST SUMMARY
MOD NO. 1

DIAM (IN)	CAPITAL COST ($)	O&M COST ($/YR)	AVERAGE ANNUAL COST ($/YR)
6.0	0.588E+06	0.221E+04	0.607E+05
8.0	0.778E+06	0.249E+04	0.799E+05
10.0	0.967E+06	0.277E+04	0.990E+05
12.0	0.116E+07	0.305E+04	0.118E+06

OUTPUT FOR PUMP STATION NO. 1

AREA EAST OF BVFP

MAXIMUM FLOW(STAGE 1)	0.556E+00 MGD
AVERAGE FLOW(STAGE 1)	0.371E+00 MGD
REQUIRED HEAD BASED ON FORCE MAIN MOD	1
RAW OR TREATED WATER PUMPING	
YEAR BUILT	1990
YEAR SECOND STAGE BUILT	1990
DESIGN LIFE	30 YEARS
EFFICIENCY OF PUMP AND MOTOR	0.600E+02 PERCENT
MAXIMUM HEAD PER STATION	0.100E+04 FT
NO. OF STATIONS DETERMINED BY PROGRAM	
NO. PUMPS PER STATION-STAGE 1	2
NO WET WELL	
SIMPLE STRUCTURE	
DOWNTIME	0.0 PERCENT

ECONOMIC OUTPUT

INTEREST RATE	0.925E+01 PERCENT
ENR INDEX	0.473E+04
CITY MULTIPLIER	0.100E+01
O&M WAGE	0.200E+02 $/HR
COST OF ELECTRICITY	0.100E+00 $/KWHR
COST OF LAND SITE IMPROVEMENT	0.000E+00 $

COST OF STRUCTURE AND SWITCHYARD FOR SINGLE STATION
COST BASED ON 0.56 MGD, BUILT IN 1990

DIAM	NO. OF STATIONS	POWER CAPACITY (KVA)	STRUCTURE COSTS ($)	SWITCHYARD COSTS ($)
6.0	1	0.130E+03	0.132E+05	0.000E+00
8.0	1	0.917E+02	0.132E+05	0.000E+00
10.0	1	0.838E+02	0.132E+05	0.000E+00
12.0	1	0.816E+02	0.132E+05	0.000E+00

COSTS FOR MECHANICAL AND ELECTRICAL EQUIPMENT FOR SINGLE STATION
COSTS FOR STAGE 1 BASED ON 0.556E+00 MGD, BUILT IN 1990

DIAM	HEAD PER STATION	MECHANIC COST	ELECTRIC COST	MISC COST	CONSTRUCT COST	OVERHEAD COST

(IN)	(FT)	($)	($)	($)	($)	($)
6.	0.859E+03	0.599E+05	0.000E+00	0.385E+05	0.145E+06	0.363E+05
8.	0.607E+03	0.515E+05	0.000E+00	0.385E+05	0.134E+06	0.335E+05
10.	0.555E+03	0.495E+05	0.000E+00	0.385E+05	0.132E+06	0.329E+05
12.	0.540E+03	0.489E+05	0.000E+00	0.385E+05	0.131E+06	0.327E+05

OPERATION AND MAINTENANCE COSTS FOR SINGLE PUMP STATION
COSTS FOR STAGE 1 BASED ON 0.371E+00 MGD FROM 1990 TO 2020
SUPPLY COST 0.260E+03 $/YR
LABOR COST 0.428E+04 $/YR

DIAM (IN)	HEAD REQUIRED (FT)	POWER REQUIRED (KWHR/YR)	POWER COST ($/YR)	TOTAL O&M ($/YR)
6.0	0.672E+03	0.482E+06	0.482E+05	0.527E+05
8.0	0.556E+03	0.400E+06	0.400E+05	0.445E+05
10.0	0.532E+03	0.383E+06	0.383E+05	0.428E+05
12.0	0.525E+03	0.378E+06	0.378E+05	0.423E+05

PUMP STATION COST SUMMARY
MOD NO. 1

DIAM (IN)	NO. OF STATIONS	STAGE 1 CAPITAL COST ($)	STAGE 1 O&M COST ($/YR)	STAGE 2 CAPITAL COST ($)	STAGE 2 O&M COST ($/YR)	AVERAGE ANNUAL COST ($/YR)
6.0	1	0.181E+06	0.527E+05	0.000E+00	0.000E+00	0.708E+05
8.0	1	0.168E+06	0.445E+05	0.000E+00	0.000E+00	0.612E+05
10.0	1	0.164E+06	0.428E+05	0.000E+00	0.000E+00	0.592E+05
12.0	1	0.163E+06	0.423E+05	0.000E+00	0.000E+00	0.586E+05

PIPELINE COST SUMMARY
FORCE MAIN MOD 1
PUMP STATION MOD 1

DIAM (IN)	AMORTIZED CONSTRUCTION COST(PIPE) ($/YR)	O&M COST (PIPE) ($/YR)	AMORTIZED CONSTRUCTION COST(PUMP) ($/YR)	O&M COST (PUMP) ($/YR)	AVERAGE ANNUAL COST ($/YR)
6.0	0.585E+05	0.221E+04	0.180E+05	0.527E+05	0.132E+06
8.0	0.774E+05	0.249E+04	0.167E+05	0.445E+05	0.141E+06
10.0	0.962E+05	0.277E+04	0.164E+05	0.428E+05	0.158E+06
12.0	0.115E+06	0.305E+04	0.163E+05	0.423E+05	0.177E+06

DETAILED OUTPUT, SUMMARY OR END?
INPUT MAPS COMMAND
DESIGN DATA FOR FORCE MAIN 3

INPUT FORCE MAIN DATA
DATA PUT AT 13
INPUT MAPS COMMAND
CONSTRUCT FORCE MAIN 3
DATA PUT AT 13

OUT FORCE MAIN 3

AREA EAST OF BVFP

MAXIMUM FLOW- STAGE 1	0.990E-01	MGD
AVERAGE FLOW- STAGE 1	0.660E-01	MGD
LENGTH	0.300E+05	FT
LENGTH	0.568E+01	MI
INITIAL ELEVATION	0.120E+04	FT
INITIAL PRESSURE HEAD	0.138E+03	FT
FINAL ELEVATION	0.120E+04	FT
FINAL PRESSURE HEAD	0.138E+03	FT
ROUGHNESS HEIGHT	0.400E-03	FT
ALLOWABLE PRESSURE IN PIPE	0.400E+03	FT

RECTANGULAR TRENCH

DEPTH OF COVER	0.300E+01	FT

DRY SOIL CONDITIONS

TYPE OF PIPE

DUCTILE IRON PIPE IS USED FOR ALL DIAMETERS

HYDRAULIC ANALYSIS AT PEAK FLOW (FIRST STAGE)

0.153 CFS 0.099 MGD

DIAM (IN)	VELOCITY (FPS)	VELOCITY HEAD (FT)	MINOR LOSSES (FT)	FRICTION LOSSES (FT)	HEAD REQUIRED (FT)
6.0	0.780E+00	0.946E-02	0.000E+00	0.156E+02	0.156E+02
8.0	0.439E+00	0.299E-02	0.000E+00	0.387E+01	0.387E+01
10.0	0.281E+00	0.123E-02	0.000E+00	0.133E+01	0.133E+01
12.0	0.195E+00	0.591E-03	0.000E+00	0.561E+00	0.561E+00

HYDRAULIC ANALYSIS AT AVERAGE FLOW (FIRST STAGE)

0.102 CFS 0.066 MGD

DIAM (IN)	VELOCITY (FPS)	VELOCITY HEAD (FT)	MINOR LOSSES (FT)	FRICTION LOSSES (FT)	HEAD REQUIRED (FT)
6.0	0.520E+00	0.420E-02	0.000E+00	0.750E+01	0.750E+01
8.0	0.293E+00	0.133E-02	0.000E+00	0.190E+01	0.190E+01
10.0	0.187E+00	0.545E-03	0.000E+00	0.660E+00	0.660E+00
12.0	0.130E+00	0.263E-03	0.000E+00	0.281E+00	0.281E+00

NO SECOND STAGE

CONSTRUCTION YEAR-STAGE 1	1990	
INTEREST RATE	9.250	%
DESIGN LIFE	30	YEARS
ENR CONSTRUCTION INDEX	4735.0	
LAND COST	0.000E+00	$
CITY MULTIPLIER	1.000	
TERRAIN TYPE--		

DIAM (IN)	PIPE COSTS ($)	OTHER COSTS ($)	CONSTRUCTION COSTS ($)	OVERHEAD COSTS ($)	OPERATION & MAINT. ($/YR)
6.0	0.4456E+06	0.1191E+06	0.5648E+06	0.1412E+06	0.2654E+04
8.0	0.5934E+06	0.1531E+06	0.7466E+06	0.1866E+06	0.2984E+04
10.0	0.7411E+06	0.1873E+06	0.9285E+06	0.2321E+06	0.3319E+04
12.0	0.8887E+06	0.2218E+06	0.1110E+07	0.2776E+06	0.3658E+04

FORCE MAIN COST SUMMARY
MOD NO. 3

DIAM (IN)	CAPITAL COST ($)	O&M COST ($/YR)	AVERAGE ANNUAL COST ($/YR)
6.0	0.706E+06	0.265E+04	0.729E+05
8.0	0.933E+06	0.298E+04	0.958E+05
10.0	0.116E+07	0.332E+04	0.119E+06
12.0	0.139E+07	0.366E+04	0.142E+06

INPUT MAPS COMMAND
DESIGN DATA FOR FORCE MAIN 2

INPUT FORCE MAIN DATA
DATA PUT AT 14
INPUT MAPS COMMAND
DESIGN DATA FOR PUMP 2
INPUT PUMP DATA
DATA PUT AT 15

```
INPUT MAPS COMMAND
CONSTRUCT FORCE MAIN   2
DATA PUT AT  14
CONSTRUCT PUMP   2
DATA PUT AT  15



PIPE LINE WITH FORCE MOD   2
AND PIPE MOD   2
DETAILED OUTPUT, SUMMARY OR END?
```

OUTPUT FOR FORCE MAIN NO 2

AREA WEST OF BVFP

MAXIMUM FLOW- STAGE 1	0.164E+00 MGD
AVERAGE FLOW- STAGE 1	0.109E+00 MGD
LENGTH	0.110E+05 FT
LENGTH	0.208E+01 MI
INITIAL ELEVATION	0.680E+03 FT
INITIAL PRESSURE HEAD	0.138E+03 FT
FINAL ELEVATION	0.760E+03 FT
FINAL PRESSURE HEAD	0.138E+03 FT
ROUGHNESS HEIGHT	0.400E-03 FT
ALLOWABLE PRESSURE IN PIPE	0.400E+03 FT

RECTANGULAR TRENCH

DEPTH OF COVER 0.300E+01 FT

DRY SOIL CONDITIONS

TYPE OF PIPE

DUCTILE IRON PIPE IS USED FOR ALL DIAMETERS

HYDRAULIC ANALYSIS AT PEAK FLOW (FIRST STAGE)

0.254 CFS 0.164 MGD

DIAM (IN)	VELOCITY (FPS)	VELOCITY HEAD (FT)	MINOR LOSSES (FT)	FRICTION LOSSES (FT)	HEAD REQUIRED (FT)
6.0	0.129E+01	0.259E-01	0.000E+00	0.144E+02	0.944E+02
8.0	0.727E+00	0.821E-02	0.000E+00	0.351E+01	0.835E+02
10.0	0.465E+00	0.336E-02	0.000E+00	0.119E+01	0.812E+02
12.0	0.323E+00	0.162E-02	0.000E+00	0.497E+00	0.805E+02

HYDRAULIC ANALYSIS AT AVERAGE FLOW (FIRST STAGE)

0.169 CFS 0.109 MGD

DIAM (IN)	VELOCITY (FPS)	VELOCITY HEAD (FT)	MINOR LOSSES (FT)	FRICTION LOSSES (FT)	HEAD REQUIRED (FT)
6.0	0.859E+00	0.115E-01	0.000E+00	0.680E+01	0.868E+02
8.0	0.483E+00	0.363E-02	0.000E+00	0.168E+01	0.817E+02
10.0	0.309E+00	0.149E-02	0.000E+00	0.578E+00	0.806E+02
12.0	0.215E+00	0.716E-03	0.000E+00	0.243E+00	0.802E+02

NO SECOND STAGE

CONSTRUCTION YEAR-STAGE 1	1990	
INTEREST RATE	9.250	%
DESIGN LIFE	30	YEARS
ENR CONSTRUCTION INDEX	4735.0	
LAND COST	0.000E+00	$
CITY MULTIPLIER	1.000	
TERRAIN TYPE--		

DIAM (IN)	PIPE COSTS ($)	OTHER COSTS ($)	CONSTRUCTION COSTS ($)	OVERHEAD COSTS ($)	OPERATION & MAINT. ($/YR)
6.0	0.1634E+06	0.4368E+05	0.2071E+06	0.5177E+05	0.9733E+03
8.0	0.2176E+06	0.5614E+05	0.2737E+06	0.6844E+05	0.1094E+04
10.0	0.2717E+06	0.6869E+05	0.3404E+06	0.8511E+05	0.1217E+04
12.0	0.3258E+06	0.8133E+05	0.4072E+06	0.1018E+06	0.1341E+04

FORCE MAIN COST SUMMARY
MOD NO. 2

DIAM (IN)	CAPITAL COST ($)	O&M COST ($/YR)	AVERAGE ANNUAL COST ($/YR)
6.0	0.259E+06	0.973E+03	0.267E+05
8.0	0.342E+06	0.109E+04	0.351E+05
10.0	0.426E+06	0.122E+04	0.436E+05
12.0	0.509E+06	0.134E+04	0.520E+05

OUTPUT FOR PUMP STATION NO. 2

AREA WEST OF BVFP

MAXIMUM FLOW(STAGE 1)	0.164E+00 MGD
AVERAGE FLOW(STAGE 1)	0.109E+00 MGD
REQUIRED HEAD BASED ON FORCE MAIN MOD	2
RAW OR TREATED WATER PUMPING	
YEAR BUILT	1990
YEAR SECOND STAGE BUILT	1990
DESIGN LIFE	30 YEARS
EFFICIENCY OF PUMP AND MOTOR	0.600E+02 PERCENT
MAXIMUM HEAD PER STATION	0.100E+04 FT
NO. OF STATIONS DETERMINED BY PROGRAM	
NO. PUMPS PER STATION-STAGE 1	2
NO WET WELL	
SIMPLE STRUCTURE	
DOWNTIME	0.0 PERCENT

ECONOMIC OUTPUT

INTEREST RATE	0.925E+01 PERCENT
ENR INDEX	0.473E+04
CITY MULTIPLIER	0.100E+01
O&M WAGE	0.200E+02 $/HR
COST OF ELECTRICITY	0.100E+00 $/KWHR
COST OF LAND SITE IMPROVEMENT	0.000E+00 $

COST OF STRUCTURE AND SWITCHYARD FOR SINGLE STATION
COST BASED ON 0.16 MGD, BUILT IN 1990

DIAM	NO. OF STATIONS	POWER CAPACITY (KVA)	STRUCTURE COSTS ($)	SWITCHYARD COSTS ($)
6.0	1	0.465E+01	0.861E+04	0.000E+00
8.0	1	0.416E+01	0.861E+04	0.000E+00
10.0	1	0.406E+01	0.861E+04	0.000E+00
12.0	1	0.403E+01	0.861E+04	0.000E+00

COSTS FOR MECHANICAL AND ELECTRICAL EQUIPMENT FOR SINGLE STATION
COSTS FOR STAGE 1 BASED ON 0.164E+00 MGD, BUILT IN 1990

DIAM	HEAD PER STATION	MECHANIC COST	ELECTRIC COST	MISC COST	CONSTRUCT COST	OVERHEAD COST

(IN)	(FT)	($)	($)	($)	($)	($)
6.	0.104E+03	0.172E+05	0.000E+00	0.220E+05	0.622E+05	0.156E+05
8.	0.935E+02	0.164E+05	0.000E+00	0.220E+05	0.612E+05	0.153E+05
10.	0.912E+02	0.163E+05	0.000E+00	0.220E+05	0.610E+05	0.152E+05
12.	0.905E+02	0.162E+05	0.000E+00	0.220E+05	0.609E+05	0.152E+05

OPERATION AND MAINTENANCE COSTS FOR SINGLE PUMP STATION
COSTS FOR STAGE 1 BASED ON 0.109E+00 MGD FROM 1990 TO 2020
SUPPLY COST 0.829E+02 $/YR
LABOR COST 0.210E+04 $/YR

DIAM (IN)	HEAD REQUIRED (FT)	POWER REQUIRED (KWHR/YR)	POWER COST ($/YR)	TOTAL O&M ($/YR)
6.0	0.868E+02	0.201E+05	0.201E+04	0.419E+04
8.0	0.817E+02	0.190E+05	0.190E+04	0.409E+04
10.0	0.806E+02	0.188E+05	0.188E+04	0.406E+04
12.0	0.802E+02	0.187E+05	0.187E+04	0.406E+04

PUMP STATION COST SUMMARY
MOD NO. 2

DIAM (IN)	NO. OF STATIONS	STAGE 1 CAPITAL COST ($)	STAGE 1 O&M COST ($/YR)	STAGE 2 CAPITAL COST ($)	STAGE 2 O&M COST ($/YR)	AVERAGE ANNUAL COST ($/YR)
6.0	1	0.778E+05	0.419E+04	0.000E+00	0.000E+00	0.119E+05
8.0	1	0.765E+05	0.409E+04	0.000E+00	0.000E+00	0.117E+05
10.0	1	0.762E+05	0.406E+04	0.000E+00	0.000E+00	0.116E+05
12.0	1	0.761E+05	0.406E+04	0.000E+00	0.000E+00	0.116E+05

PIPELINE COST SUMMARY
FORCE MAIN MOD 2
PUMP STATION MOD 2

DIAM (IN)	AMORTIZED CONSTRUCTION COST(PIPE) ($/YR)	O&M COST (PIPE) ($/YR)	AMORTIZED CONSTRUCTION COST(PUMP) ($/YR)	O&M COST (PUMP) ($/YR)	AVERAGE ANNUAL COST ($/YR)
6.0	0.258E+05	0.973E+03	0.774E+04	0.419E+04	0.387E+05
8.0	0.340E+05	0.109E+04	0.761E+04	0.409E+04	0.468E+05
10.0	0.423E+05	0.122E+04	0.758E+04	0.406E+04	0.552E+05
12.0	0.506E+05	0.134E+04	0.757E+04	0.406E+04	0.636E+05

DETAILED OUTPUT, SUMMARY OR END?
INPUT MAPS COMMAND
STOP - NORMAL TERMINATION

Appendix C
Lower Bartlett Water Precinct

LOWER BARTLETT WATER PRECINCT WORKSHEET CALCULATIONS

EXISTING CONDITIONS	# of service conn	Estimated Ave Day Demand (Kgal/d)	Reported Yield (Kgal/d)	Estimated Elevation of service area (ft. NGVD)	Reported Storage
Lower Bartlett Water Prec.	340	150	1080	540	2 tanks 250000 tank @900 500000 tank

SMALL SYSTEMS Map#/name of system (1)	EPA #	# of units approved	Calc (2) Ave Day Demand (Kgal/d)	Reported Well Capacity (Kgal/d)	Estimated Elevation of Service Area (ft. NGVD)	Estimated dist pipe Length (ft.)
AREA SOUTH OF PRECINCT						
1.Eagle Ridge	C0160010	120	45.0	90.0	600	2500
Subtotal:		120	45	90		2500
AREA NORTH OF PRECINCT						
4.Holiday Ridge	C0162010	50	18.8	360.0	700	4000
26.Village Bianco	C0162260	15	5.6	41.8	900	6000
Subtotal:		65	24	402		10000

EXISTING DEMAND IN PRECINCT	150	
CALC. ADDITIONAL DEMAND =	69	(Kgal/d)
EXISTING SUPPLY IN PRECINCT	1080	(Kgal/d)
DEFICIT =	0	(Kgal/d)

(1) Data was obtained from NH DES DWS files
(2) Based on (# of units x 2.5 bedrooms/unit x150 = gpd)

```
MAPS VERSION 26 JAN 87
INITIALIZE OR RESTORE?
INPUT MAPS COMMAND
ECONOMIC DATA GOES HERE

INPUT ECONOMIC DATA
DATA PUT AT    6
INPUT MAPS COMMAND
DESIGN DATA FOR FORCE MAIN    1

INPUT FORCE MAIN DATA
DATA PUT AT    8
INPUT MAPS COMMAND
DESIGN DATA FOR PUMP    1
INPUT PUMP DATA
DATA PUT AT   10
INPUT MAPS COMMAND
CONSTRUCT FORCE MAIN    1
DATA PUT AT    8
CONSTRUCT PUMP    1
DATA PUT AT   10



PIPE LINE WITH FORCE MOD    1
AND PIPE MOD    1
DETAILED OUTPUT, SUMMARY OR END?
```

OUTPUT FOR FORCE MAIN NO 1

AREA SOUTH OF LBWP

MAXIMUM FLOW- STAGE 1	0.680E-01 MGD
AVERAGE FLOW- STAGE 1	0.450E-01 MGD
LENGTH	0.250E+04 FT
LENGTH	0.473E+00 MI
INITIAL ELEVATION	0.540E+03 FT
INITIAL PRESSURE HEAD	0.138E+03 FT
FINAL ELEVATION	0.600E+03 FT
FINAL PRESSURE HEAD	0.138E+03 FT
ROUGHNESS HEIGHT	0.400E-03 FT
ALLOWABLE PRESSURE IN PIPE	0.400E+03 FT
RECTANGULAR TRENCH	
DEPTH OF COVER	0.300E+01 FT
DRY SOIL CONDITIONS	
TYPE OF PIPE	

DUCTILE IRON PIPE IS USED FOR ALL DIAMETERS

HYDRAULIC ANALYSIS AT PEAK FLOW (FIRST STAGE)
0.105 CFS 0.068 MGD

DIAM (IN)	VELOCITY (FPS)	VELOCITY HEAD (FT)	MINOR LOSSES (FT)	FRICTION LOSSES (FT)	HEAD REQUIRED (FT)
6.0	0.536E+00	0.446E-02	0.000E+00	0.659E+00	0.607E+02
8.0	0.301E+00	0.141E-02	0.000E+00	0.166E+00	0.602E+02
10.0	0.193E+00	0.578E-03	0.000E+00	0.579E-01	0.601E+02
12.0	0.134E+00	0.279E-03	0.000E+00	0.246E-01	0.600E+02

HYDRAULIC ANALYSIS AT AVERAGE FLOW (FIRST STAGE)
0.070 CFS 0.045 MGD

DIAM (IN)	VELOCITY (FPS)	VELOCITY HEAD (FT)	MINOR LOSSES (FT)	FRICTION LOSSES (FT)	HEAD REQUIRED (FT)
6.0	0.355E+00	0.195E-02	0.000E+00	0.318E+00	0.603E+02
8.0	0.199E+00	0.618E-03	0.000E+00	0.816E-01	0.601E+02
10.0	0.128E+00	0.253E-03	0.000E+00	0.287E-01	0.600E+02
12.0	0.886E-01	0.122E-03	0.000E+00	0.123E-01	0.600E+02

NO SECOND STAGE

CONSTRUCTION YEAR-STAGE 1	1990	
INTEREST RATE	9.250	%
DESIGN LIFE	30	YEARS
ENR CONSTRUCTION INDEX	4735.0	
LAND COST	0.000E+00	$
CITY MULTIPLIER	1.000	
TERRAIN TYPE--		

DIAM (IN)	PIPE COSTS ($)	OTHER COSTS ($)	CONSTRUCTION COSTS ($)	OVERHEAD COSTS ($)	OPERATION & MAINT. ($/YR)
6.0	0.3714E+05	0.9927E+04	0.4706E+05	0.1177E+05	0.2212E+03
8.0	0.4945E+05	0.1276E+05	0.6221E+05	0.1555E+05	0.2487E+03
10.0	0.6176E+05	0.1561E+05	0.7737E+05	0.1934E+05	0.2766E+03
12.0	0.7406E+05	0.1848E+05	0.9254E+05	0.2313E+05	0.3048E+03

FORCE MAIN COST SUMMARY
MOD NO. 1

DIAM (IN)	CAPITAL COST ($)	O&M COST ($/YR)	AVERAGE ANNUAL COST ($/YR)
6.0	0.588E+05	0.221E+03	0.607E+04
8.0	0.778E+05	0.249E+03	0.799E+04
10.0	0.967E+05	0.277E+03	0.990E+04
12.0	0.116E+06	0.305E+03	0.118E+05

OUTPUT FOR PUMP STATION NO. 1

AREA SOUTH OF LBWP

MAXIMUM FLOW(STAGE 1)	0.680E-01 MGD
AVERAGE FLOW(STAGE 1)	0.450E-01 MGD
REQUIRED HEAD BASED ON FORCE MAIN MOD	1
RAW OR TREATED WATER PUMPING	
YEAR BUILT	1990
YEAR SECOND STAGE BUILT	1990
DESIGN LIFE	30 YEARS
EFFICIENCY OF PUMP AND MOTOR	0.600E+02 PERCENT
MAXIMUM HEAD PER STATION	0.100E+04 FT
NO. OF STATIONS DETERMINED BY PROGRAM	
NO. PUMPS PER STATION-STAGE 1	2
NO WET WELL	
SIMPLE STRUCTURE	
DOWNTIME	0.0 PERCENT

ECONOMIC OUTPUT

INTEREST RATE	0.925E+01 PERCENT
ENR INDEX	0.473E+04
CITY MULTIPLIER	0.100E+01
O&M WAGE	0.200E+02 $/HR
COST OF ELECTRICITY	0.100E+00 $/KWHR
COST OF LAND SITE IMPROVEMENT	0.000E+00 $

COST OF STRUCTURE AND SWITCHYARD FOR SINGLE STATION
COST BASED ON 0.07 MGD, BUILT IN 1990

DIAM	NO. OF STATIONS	POWER CAPACITY (KVA)	STRUCTURE COSTS ($)	SWITCHYARD COSTS ($)
6.0	1	0.130E+01	0.632E+04	0.000E+00
8.0	1	0.130E+01	0.632E+04	0.000E+00
10.0	1	0.129E+01	0.632E+04	0.000E+00
12.0	1	0.129E+01	0.632E+04	0.000E+00

COSTS FOR MECHANICAL AND ELECTRICAL EQUIPMENT FOR SINGLE STATION
COSTS FOR STAGE 1 BASED ON 0.680E-01 MGD, BUILT IN 1990

DIAM	HEAD PER STATION	MECHANIC COST	ELECTRIC COST	MISC COST	CONSTRUCT COST	OVERHEAD COST

(IN)	(FT)	($)	($)	($)	($)	($)
6.	0.707E+02	0.115E+05	0.000E+00	0.147E+05	0.424E+05	0.106E+05
8.	0.702E+02	0.115E+05	0.000E+00	0.147E+05	0.423E+05	0.106E+05
10.	0.701E+02	0.115E+05	0.000E+00	0.147E+05	0.423E+05	0.106E+05
12.	0.700E+02	0.115E+05	0.000E+00	0.147E+05	0.423E+05	0.106E+05

OPERATION AND MAINTENANCE COSTS FOR SINGLE PUMP STATION
COSTS FOR STAGE 1 BASED ON 0.450E-01 MGD FROM 1990 TO 2020
SUPPLY COST 0.362E+02 $/YR
LABOR COST 0.126E+04 $/YR

DIAM (IN)	HEAD REQUIRED (FT)	POWER REQUIRED (KWHR/YR)	POWER COST ($/YR)	TOTAL O&M ($/YR)
6.0	0.603E+02	0.603E+04	0.603E+03	0.190E+04
8.0	0.601E+02	0.601E+04	0.601E+03	0.189E+04
10.0	0.600E+02	0.600E+04	0.600E+03	0.189E+04
12.0	0.600E+02	0.600E+04	0.600E+03	0.189E+04

PUMP STATION COST SUMMARY
MOD NO. 1

DIAM (IN)	NO. OF STATIONS	STAGE 1 CAPITAL COST ($)	STAGE 1 O&M COST ($/YR)	STAGE 2 CAPITAL COST ($)	STAGE 2 O&M COST ($/YR)	AVERAGE ANNUAL COST ($/YR)
6.0	1	0.529E+05	0.190E+04	0.000E+00	0.000E+00	0.716E+04
8.0	1	0.529E+05	0.189E+04	0.000E+00	0.000E+00	0.716E+04
10.0	1	0.529E+05	0.189E+04	0.000E+00	0.000E+00	0.715E+04
12.0	1	0.529E+05	0.189E+04	0.000E+00	0.000E+00	0.715E+04

PIPELINE COST SUMMARY
FORCE MAIN MOD 1
PUMP STATION MOD 1

DIAM (IN)	AMORTIZED CONSTRUCTION COST(PIPE) ($/YR)	O&M COST (PIPE) ($/YR)	AMORTIZED CONSTRUCTION COST(PUMP) ($/YR)	O&M COST (PUMP) ($/YR)	AVERAGE ANNUAL COST ($/YR)
6.0	0.585E+04	0.221E+03	0.527E+04	0.190E+04	0.132E+05
8.0	0.774E+04	0.249E+03	0.526E+04	0.189E+04	0.151E+05
10.0	0.962E+04	0.277E+03	0.526E+04	0.189E+04	0.171E+05
12.0	0.115E+05	0.305E+03	0.526E+04	0.189E+04	0.190E+05

DETAILED OUTPUT, SUMMARY OR END?
INPUT MAPS COMMAND
DESIGN DATA FOR FORCE MAIN 2

INPUT FORCE MAIN DATA
DATA PUT AT 11
INPUT MAPS COMMAND
DESIGN DATA FOR PUMP 2
INPUT PUMP DATA
DATA PUT AT 12
INPUT MAPS COMMAND
CONSTRUCT FORCE MAIN 2
DATA PUT AT 11
CONSTRUCT PUMP 2
DATA PUT AT 12

```
PIPE LINE WITH FORCE MOD    2
AND PIPE MOD    2
DETAILED OUTPUT, SUMMARY OR END?
```

OUTPUT FOR FORCE MAIN NO 2

AREA NORTH OF LBWP

MAXIMUM FLOW- STAGE 1	0.360E-01 MGD
AVERAGE FLOW- STAGE 1	0.240E-01 MGD
LENGTH	0.100E+05 FT
LENGTH	0.189E+01 MI
INITIAL ELEVATION	0.540E+03 FT
INITIAL PRESSURE HEAD	0.138E+03 FT
FINAL ELEVATION	0.900E+03 FT
FINAL PRESSURE HEAD	0.138E+03 FT
ROUGHNESS HEIGHT	0.400E-03 FT
ALLOWABLE PRESSURE IN PIPE	0.400E+03 FT

RECTANGULAR TRENCH
DEPTH OF COVER 0.300E+01 FT
DRY SOIL CONDITIONS
TYPE OF PIPE
DUCTILE IRON PIPE IS USED FOR ALL DIAMETERS

HYDRAULIC ANALYSIS AT PEAK FLOW (FIRST STAGE)
0.056 CFS 0.036 MGD

DIAM (IN)	VELOCITY (FPS)	VELOCITY HEAD (FT)	MINOR LOSSES (FT)	FRICTION LOSSES (FT)	HEAD REQUIRED (FT)
6.0	0.284E+00	0.125E-02	0.000E+00	0.864E+00	0.361E+03
8.0	0.160E+00	0.396E-03	0.000E+00	0.224E+00	0.360E+03
10.0	0.102E+00	0.162E-03	0.000E+00	0.791E-01	0.360E+03
12.0	0.709E-01	0.781E-04	0.000E+00	0.340E-01	0.360E+03

HYDRAULIC ANALYSIS AT AVERAGE FLOW (FIRST STAGE)
0.037 CFS 0.024 MGD

DIAM (IN)	VELOCITY (FPS)	VELOCITY HEAD (FT)	MINOR LOSSES (FT)	FRICTION LOSSES (FT)	HEAD REQUIRED (FT)
6.0	0.189E+00	0.556E-03	0.000E+00	0.433E+00	0.360E+03
8.0	0.106E+00	0.176E-03	0.000E+00	0.114E+00	0.360E+03
10.0	0.681E-01	0.720E-04	0.000E+00	0.406E-01	0.360E+03
12.0	0.473E-01	0.347E-04	0.000E+00	0.176E-01	0.360E+03

NO SECOND STAGE

CONSTRUCTION YEAR-STAGE 1	1990	
INTEREST RATE	9.250	%
DESIGN LIFE	30	YEARS
ENR CONSTRUCTION INDEX	4735.0	
LAND COST	0.000E+00	$
CITY MULTIPLIER	1.000	
TERRAIN TYPE--		

DIAM (IN)	PIPE COSTS ($)	OTHER COSTS ($)	CONSTRUCTION COSTS ($)	OVERHEAD COSTS ($)	OPERATION & MAINT. ($/YR)
6.0	0.1485E+06	0.3971E+05	0.1883E+06	0.4706E+05	0.8848E+03
8.0	0.1978E+06	0.5104E+05	0.2489E+06	0.6221E+05	0.9946E+03
10.0	0.2470E+06	0.6245E+05	0.3095E+06	0.7737E+05	0.1106E+04
12.0	0.2962E+06	0.7394E+05	0.3702E+06	0.9254E+05	0.1219E+04

FORCE MAIN COST SUMMARY
MOD NO. 2

DIAM (IN)	CAPITAL COST ($)	O&M COST ($/YR)	AVERAGE ANNUAL COST ($/YR)
6.0	0.235E+06	0.885E+03	0.243E+05
8.0	0.311E+06	0.995E+03	0.319E+05
10.0	0.387E+06	0.111E+04	0.396E+05
12.0	0.463E+06	0.122E+04	0.473E+05

OUTPUT FOR PUMP STATION NO. 2

AREA NORTH OF LBWP

MAXIMUM FLOW(STAGE 1)	0.360E-01	MGD
AVERAGE FLOW(STAGE 1)	0.240E-01	MGD
REQUIRED HEAD BASED ON FORCE MAIN MOD	2	
RAW OR TREATED WATER PUMPING		
YEAR BUILT	1990	
YEAR SECOND STAGE BUILT	1990	
DESIGN LIFE	30	YEARS
EFFICIENCY OF PUMP AND MOTOR	0.600E+02	PERCENT
MAXIMUM HEAD PER STATION	0.100E+04	FT
NO. OF STATIONS DETERMINED BY PROGRAM		
NO. PUMPS PER STATION-STAGE 1	2	
NO WET WELL		
SIMPLE STRUCTURE		
DOWNTIME	0.0	PERCENT

ECONOMIC OUTPUT

INTEREST RATE	0.925E+01	PERCENT
ENR INDEX	0.473E+04	
CITY MULTIPLIER	0.100E+01	
O&M WAGE	0.200E+02	$/HR
COST OF ELECTRICITY	0.100E+00	$/KWHR
COST OF LAND SITE IMPROVEMENT	0.000E+00	$

COST OF STRUCTURE AND SWITCHYARD FOR SINGLE STATION
COST BASED ON 0.04 MGD, BUILT IN 1990

DIAM	NO. OF STATIONS	POWER CAPACITY (KVA)	STRUCTURE COSTS ($)	SWITCHYARD COSTS ($)
6.0	1	0.363E+01	0.506E+04	0.000E+00
8.0	1	0.362E+01	0.506E+04	0.000E+00
10.0	1	0.362E+01	0.506E+04	0.000E+00
12.0	1	0.362E+01	0.506E+04	0.000E+00

COSTS FOR MECHANICAL AND ELECTRICAL EQUIPMENT FOR SINGLE STATION
COSTS FOR STAGE 1 BASED ON 0.360E-01 MGD, BUILT IN 1990

DIAM	HEAD PER STATION	MECHANIC COST	ELECTRIC COST	MISC COST	CONSTRUCT COST	OVERHEAD COST

(IN)	(FT)	($)	($)	($)	($)	($)
6.	0.371E+03	0.201E+05	0.000E+00	0.110E+05	0.471E+05	0.118E+05
8.	0.370E+03	0.201E+05	0.000E+00	0.110E+05	0.471E+05	0.118E+05
10.	0.370E+03	0.201E+05	0.000E+00	0.110E+05	0.471E+05	0.118E+05
12.	0.370E+03	0.201E+05	0.000E+00	0.110E+05	0.471E+05	0.118E+05

OPERATION AND MAINTENANCE COSTS FOR SINGLE PUMP STATION
COSTS FOR STAGE 1 BASED ON 0.240E-01 MGD FROM 1990 TO 2020
SUPPLY COST 0.201E+02 $/YR
LABOR COST 0.874E+03 $/YR

DIAM (IN)	HEAD REQUIRED (FT)	POWER REQUIRED (KWHR/YR)	POWER COST ($/YR)	TOTAL O&M ($/YR)
6.0	0.360E+03	0.169E+05	0.169E+04	0.259E+04
8.0	0.360E+03	0.169E+05	0.169E+04	0.259E+04
10.0	0.360E+03	0.169E+05	0.169E+04	0.258E+04
12.0	0.360E+03	0.169E+05	0.169E+04	0.258E+04

PUMP STATION COST SUMMARY
MOD NO. 2

DIAM (IN)	NO. OF STATIONS	STAGE 1 CAPITAL COST ($)	STAGE 1 O&M COST ($/YR)	STAGE 2 CAPITAL COST ($)	STAGE 2 O&M COST ($/YR)	AVERAGE ANNUAL COST ($/YR)
6.0	1	0.588E+05	0.259E+04	0.000E+00	0.000E+00	0.844E+04
8.0	1	0.588E+05	0.259E+04	0.000E+00	0.000E+00	0.844E+04
10.0	1	0.588E+05	0.258E+04	0.000E+00	0.000E+00	0.844E+04
12.0	1	0.588E+05	0.258E+04	0.000E+00	0.000E+00	0.844E+04

PIPELINE COST SUMMARY
FORCE MAIN MOD 2
PUMP STATION MOD 2

DIAM (IN)	AMORTIZED CONSTRUCTION COST(PIPE) ($/YR)	O&M COST (PIPE) ($/YR)	AMORTIZED CONSTRUCTION COST(PUMP) ($/YR)	O&M COST (PUMP) ($/YR)	AVERAGE ANNUAL COST ($/YR)
6.0	0.234E+05	0.885E+03	0.586E+04	0.259E+04	0.327E+05
8.0	0.310E+05	0.995E+03	0.585E+04	0.259E+04	0.404E+05
10.0	0.385E+05	0.111E+04	0.585E+04	0.258E+04	0.480E+05
12.0	0.460E+05	0.122E+04	0.585E+04	0.258E+04	0.557E+05

DETAILED OUTPUT, SUMMARY OR END?
INPUT MAPS COMMAND
STOP - NORMAL TERMINATION

Appendix D
Jackson Water Precinct

JACKSON WATER PRECINCT WORKSHEET CALCULATIONS

EXISTING CONDITIONS	# of service conn.	Estimated Ave Day Demand (Kgal/d)	Reported Yield (Kgal/d)	Estimated Elevation of precinct (ft. NGVD)	Reported Storage
Jackson Water Precinct	152	not avail	not avail	740	2 tanks

Map#/System Name (1)	EPA #	# of units approved	Calc. (2) Ave Day Demand (Kgal/d)	Reported Well Capacity (Kgal/d)	Estimated Elevation of system (ft. NGVD)	Estimated dist. pipe length (ft.)
AREA SOUTH ALONG ROUTE 16						
3.Goodrich Falls	C0161030	16	6.0	36.0	740	500
6.North Ledge	C0162050	32	12.0	28.8	1300	500
7.Glen Acres	C0162060	17	6.4	12.0	1200	1000
8.Linderhof Golf	C0162070	119	44.6	129.6	640	500
10.Linderhoff Mt.	C0162090	231	86.6	204.0	900	3000
11.River Bend	C0162100	15	5.6	10.0	800	500
22.Christmas Mt	C0162220	96	36.0	57.6	900	2000
23.Partridge Woods	C0162230	48	18.0	86.4	1100	9000
27.Nordic Vill.	C0162270	143	53.6	141.1	800	500
30.Whispering Brook	C0162310	12	4.5	43.0	800	1000
31.Pine Glen	C0162320	20	7.5	87.8	760	1000
34.Goodrich	C0162350	100	37.5	223.2	620	2500
35.Kearsarge	C0162360	15	5.6	28.0	800	1000
Subtotal		864	324	1088		23000
transmission main south along route 16						8000
AREA EAST FROM ROUTE 16B						
37.Eagle Mt. East	C1210020	40	15.0	126.0	1080	1000
38.Tyrol Develop.	C1212020	12	4.5	51.8	1700	6500
42.Black Mt.Meadow	C1212080	17	6.4	19.0	1240	4000
43.Black Mt.Pastures	C1212090	10	3.8	68.0	1500	2500
44.Spruce Mt	C1212120	60	22.5	72.0	1060	6500
Subtotal		139	52	337		20500
transmission main east from route 16B						8000
AREA NORTH ALONG ROUTE 16						
39.Wildcat Cond	C1212030	28	10.5	17.0	1160	3000
40.Jefferson/Madison	C1212050	30	11.3	187.0	1100	1000
41.Ellis R.Vill	C1212060	8	3.0	36.0	1300	2000
Subtotal		66	25	240		6000
transmission main north along Route 16						16000

EXISTING DEMAND IN PRECINCT = not avail.
CALC. DEMAND IN PRECINCT = 401 Kgal/day
EXISTING SUPPLY IN WATER PRECINCT = not avail.
DEFICIT = not avail.

(1) Data was obtained from NH DES DWS files
(2) Based on (# of units x 2.5 bedrooms/unit x 150 =gpd)

```
MAPS VERSION 26 JAN 87
INITIALIZE OR RESTORE?
INPUT MAPS COMMAND
ECONOMIC DATA GOES HERE

INPUT ECONOMIC DATA
DATA PUT AT    6
INPUT MAPS COMMAND
TITL IS INAPPROPRIATE COMMAND-TRY AGAIN
INPUT MAPS COMMAND
DATA FOR STORAGE TANK    1
INPUT STORAGE TANK DATA
DATA PUT AT    8
INPUT MAPS COMMAND
CONSTRUCT STORAGE TANK    1
DATA PUT AT    8



STORAGE TANK OUTPUT MOD    1
STORAGE TANK MOD  1



VOLUME                                    0.400E+00 MG
CONCRETE TANK                             0.296E+06 $

ECONOMIC FACTORS
DESIGN LIFE                                 30  YEARS
YEAR BUILT                                  1990
ENR INDEX                                 0.473E+04
INTEREST RATE                             9.25 PERCENT
INFLATION RATE                            0.00 PERCENT
CITY MULTIPLIER                           0.100E+01
O&M WAGE RATE                             0.200E+02 $/HR

    COST SUMMARY
              COST IN 1990  COST IN 1990  COST IN 1990
              DOLLARS       DOLLARS       DOLLARS
              BUILT IN 1990 BUILT IN 1990 BUILT IN 1990
                                          W/ 0.0% INFLATION
```

CONSTRUCTION($)	0.296E+06	0.296E+06	0.296E+06
INDIRECT CONS($)	0.740E+05	0.740E+05	0.740E+05
CAPITAL COST($)	0.370E+06	0.370E+06	0.370E+06
AMORTIZED($/YR)	0.368E+05	0.368E+05	0.368E+05
LABOR COST($/YR)	0.000E+00	0.000E+00	0.000E+00
SUPPLY COST($/YR)	0.000E+00	0.000E+00	0.000E+00
POWER($/YR)	0.000E+00	0.000E+00	0.000E+00
TOTAL O&M($/YR)	0.296E+04	0.296E+04	0.296E+04
AVE ANNUAL($/YR)	0.398E+05	0.398E+05	0.398E+05

****

INPUT MAPS COMMAND
DESIGN DATA FOR FORCE MAIN 1

INPUT FORCE MAIN DATA
DATA PUT AT 10
INPUT MAPS COMMAND
DESIGN DATA FOR PUMP 1
INPUT PUMP DATA
DATA PUT AT 12
INPUT MAPS COMMAND
CONSTRUCT FORCE MAIN 1
DATA PUT AT 10
CONSTRUCT PUMP 1
DATA PUT AT 12

PIPE LINE WITH FORCE MOD 1
AND PIPE MOD 1
DETAILED OUTPUT, SUMMARY OR END?

OUTPUT FOR FORCE MAIN NO 1

AREA SOUTH ALONG ROUTE 16

MAXIMUM FLOW- STAGE 1	0.486E+00 MGD
AVERAGE FLOW- STAGE 1	0.324E+00 MGD
LENGTH	0.800E+04 FT
LENGTH	0.152E+01 MI
INITIAL ELEVATION	0.740E+03 FT
INITIAL PRESSURE HEAD	0.138E+03 FT
FINAL ELEVATION	0.130E+04 FT
FINAL PRESSURE HEAD	0.138E+03 FT
ROUGHNESS HEIGHT	0.400E-03 FT
ALLOWABLE PRESSURE IN PIPE	0.400E+03 FT
RECTANGULAR TRENCH	
DEPTH OF COVER	0.300E+01 FT
DRY SOIL CONDITIONS	
TYPE OF PIPE	
DUCTILE IRON PIPE IS USED FOR ALL DIAMETERS	

HYDRAULIC ANALYSIS AT PEAK FLOW (FIRST STAGE)
0.752 CFS 0.486 MGD

DIAM (IN)	VELOCITY (FPS)	VELOCITY HEAD (FT)	MINOR LOSSES (FT)	FRICTION LOSSES (FT)	HEAD REQUIRED (FT)
6.0	0.383E+01	0.228E+00	0.000E+00	0.814E+02	0.641E+03
8.0	0.215E+01	0.721E-01	0.000E+00	0.192E+02	0.579E+03
10.0	0.138E+01	0.295E-01	0.000E+00	0.632E+01	0.566E+03
12.0	0.957E+00	0.142E-01	0.000E+00	0.257E+01	0.563E+03

HYDRAULIC ANALYSIS AT AVERAGE FLOW (FIRST STAGE)
0.501 CFS 0.324 MGD

DIAM (IN)	VELOCITY (FPS)	VELOCITY HEAD (FT)	MINOR LOSSES (FT)	FRICTION LOSSES (FT)	HEAD REQUIRED (FT)
6.0	0.255E+01	0.101E+00	0.000E+00	0.376E+02	0.598E+03
8.0	0.144E+01	0.320E-01	0.000E+00	0.896E+01	0.569E+03
10.0	0.919E+00	0.131E-01	0.000E+00	0.298E+01	0.563E+03
12.0	0.638E+00	0.633E-02	0.000E+00	0.122E+01	0.561E+03

NO SECOND STAGE

CONSTRUCTION YEAR-STAGE 1	1990	
INTEREST RATE	9.250	%
DESIGN LIFE	30	YEARS
ENR CONSTRUCTION INDEX	4735.0	
LAND COST	0.000E+00	$
CITY MULTIPLIER	1.000	
TERRAIN TYPE--		

DIAM (IN)	PIPE COSTS ($)	OTHER COSTS ($)	CONSTRUCTION COSTS ($)	OVERHEAD COSTS ($)	OPERATION & MAINT. ($/YR)
6.0	0.1188E+06	0.3177E+05	0.1506E+06	0.3765E+05	0.7078E+03
8.0	0.1583E+06	0.4083E+05	0.1991E+06	0.4977E+05	0.7957E+03
10.0	0.1976E+06	0.4996E+05	0.2476E+06	0.6190E+05	0.8851E+03
12.0	0.2370E+06	0.5915E+05	0.2961E+06	0.7403E+05	0.9754E+03

FORCE MAIN COST SUMMARY
MOD NO. 1

DIAM (IN)	CAPITAL COST ($)	O&M COST ($/YR)	AVERAGE ANNUAL COST ($/YR)
6.0	0.188E+06	0.708E+03	0.194E+05
8.0	0.249E+06	0.796E+03	0.256E+05
10.0	0.309E+06	0.885E+03	0.317E+05
12.0	0.370E+06	0.975E+03	0.378E+05

OUTPUT FOR PUMP STATION NO. 1

AREA SOUTH ALONG ROUTE 16

MAXIMUM FLOW(STAGE 1)	0.486E+00 MGD
AVERAGE FLOW(STAGE 1)	0.324E+00 MGD
REQUIRED HEAD BASED ON FORCE MAIN MOD	1
RAW OR TREATED WATER PUMPING	
YEAR BUILT	1990
YEAR SECOND STAGE BUILT	1990
DESIGN LIFE	30 YEARS
EFFICIENCY OF PUMP AND MOTOR	0.600E+02 PERCENT
MAXIMUM HEAD PER STATION	0.100E+04 FT
NO. OF STATIONS DETERMINED BY PROGRAM	
NO. PUMPS PER STATION-STAGE 1	2
NO WET WELL	
SIMPLE STRUCTURE	
DOWNTIME	0.0 PERCENT

ECONOMIC OUTPUT

INTEREST RATE	0.925E+01 PERCENT
ENR INDEX	0.473E+04
CITY MULTIPLIER	0.100E+01
O&M WAGE	0.200E+02 $/HR
COST OF ELECTRICITY	0.100E+00 $/KWHR
COST OF LAND SITE IMPROVEMENT	0.000E+00 $

COST OF STRUCTURE AND SWITCHYARD FOR SINGLE STATION
COST BASED ON 0.49 MGD, BUILT IN 1990

DIAM	NO. OF STATIONS	POWER CAPACITY (KVA)	STRUCTURE COSTS ($)	SWITCHYARD COSTS ($)
6.0	1	0.860E+02	0.126E+05	0.000E+00
8.0	1	0.777E+02	0.126E+05	0.000E+00
10.0	1	0.761E+02	0.126E+05	0.000E+00
12.0	1	0.756E+02	0.126E+05	0.000E+00

COSTS FOR MECHANICAL AND ELECTRICAL EQUIPMENT FOR SINGLE STATION
COSTS FOR STAGE 1 BASED ON 0.486E+00 MGD, BUILT IN 1990

DIAM	HEAD PER STATION	MECHANIC COST	ELECTRIC COST	MISC COST	CONSTRUCT COST	OVERHEAD COST

(IN)	(FT)	($)	($)	($)	($)	($)
6.	0.651E+03	0.512E+05	0.000E+00	0.362E+05	0.130E+06	0.325E+05
8.	0.589E+03	0.490E+05	0.000E+00	0.362E+05	0.127E+06	0.318E+05
10.	0.576E+03	0.486E+05	0.000E+00	0.362E+05	0.127E+06	0.316E+05
12.	0.573E+03	0.484E+05	0.000E+00	0.362E+05	0.126E+06	0.316E+05

OPERATION AND MAINTENANCE COSTS FOR SINGLE PUMP STATION
COSTS FOR STAGE 1 BASED ON 0.324E+00 MGD FROM 1990 TO 2020
SUPPLY COST 0.230E+03 $/YR
LABOR COST 0.395E+04 $/YR

DIAM (IN)	HEAD REQUIRED (FT)	POWER REQUIRED (KWHR/YR)	POWER COST ($/YR)	TOTAL O&M ($/YR)
6.0	0.598E+03	0.375E+06	0.375E+05	0.417E+05
8.0	0.569E+03	0.357E+06	0.357E+05	0.399E+05
10.0	0.563E+03	0.354E+06	0.354E+05	0.395E+05
12.0	0.561E+03	0.352E+06	0.352E+05	0.394E+05

PUMP STATION COST SUMMARY
MOD NO. 1

DIAM (IN)	NO. OF STATIONS	STAGE 1 CAPITAL COST ($)	STAGE 1 O&M COST ($/YR)	STAGE 2 CAPITAL COST ($)	STAGE 2 O&M COST ($/YR)	AVERAGE ANNUAL COST ($/YR)
6.0	1	0.163E+06	0.417E+05	0.000E+00	0.000E+00	0.578E+05
8.0	1	0.159E+06	0.399E+05	0.000E+00	0.000E+00	0.557E+05
10.0	1	0.158E+06	0.395E+05	0.000E+00	0.000E+00	0.553E+05
12.0	1	0.158E+06	0.394E+05	0.000E+00	0.000E+00	0.551E+05

PIPELINE COST SUMMARY
FORCE MAIN MOD 1
PUMP STATION MOD 1

DIAM (IN)	AMORTIZED CONSTRUCTION COST(PIPE) ($/YR)	O&M COST (PIPE) ($/YR)	AMORTIZED CONSTRUCTION COST(PUMP) ($/YR)	O&M COST (PUMP) ($/YR)	AVERAGE ANNUAL COST ($/YR)
6.0	0.187E+05	0.708E+03	0.162E+05	0.417E+05	0.773E+05
8.0	0.248E+05	0.796E+03	0.158E+05	0.399E+05	0.813E+05
10.0	0.308E+05	0.885E+03	0.157E+05	0.395E+05	0.870E+05
12.0	0.368E+05	0.975E+03	0.157E+05	0.394E+05	0.929E+05

DETAILED OUTPUT, SUMMARY OR END?
INPUT MAPS COMMAND
DESIGN DATA FOR FORCE MAIN 2

INPUT FORCE MAIN DATA
DATA PUT AT 13
INPUT MAPS COMMAND
CONSTRUCT FORCE MAIN 2
DATA PUT AT 13

OUT FORCE MAIN 2

OUTPUT FOR FORCE MAIN NO 2

AREA SOUTH ALONG ROUTE 16

MAXIMUM FLOW- STAGE 1	0.129E+00 MGD
AVERAGE FLOW- STAGE 1	0.860E-01 MGD
LENGTH	0.230E+05 FT
LENGTH	0.436E+01 MI
INITIAL ELEVATION	0.130E+04 FT
INITIAL PRESSURE HEAD	0.138E+03 FT
FINAL ELEVATION	0.130E+04 FT
FINAL PRESSURE HEAD	0.138E+03 FT
ROUGHNESS HEIGHT	0.400E-03 FT
ALLOWABLE PRESSURE IN PIPE	0.400E+03 FT

RECTANGULAR TRENCH
DEPTH OF COVER 0.300E+01 FT
DRY SOIL CONDITIONS
TYPE OF PIPE
DUCTILE IRON PIPE IS USED FOR ALL DIAMETERS

HYDRAULIC ANALYSIS AT PEAK FLOW (FIRST STAGE)
0.200 CFS 0.129 MGD

DIAM (IN)	VELOCITY (FPS)	VELOCITY HEAD (FT)	MINOR LOSSES (FT)	FRICTION LOSSES (FT)	HEAD REQUIRED (FT)
6.0	0.102E+01	0.161E-01	0.000E+00	0.193E+02	0.193E+02
8.0	0.572E+00	0.508E-02	0.000E+00	0.476E+01	0.476E+01
10.0	0.366E+00	0.208E-02	0.000E+00	0.163E+01	0.163E+01
12.0	0.254E+00	0.100E-02	0.000E+00	0.682E+00	0.682E+00

HYDRAULIC ANALYSIS AT AVERAGE FLOW (FIRST STAGE)
0.133 CFS 0.086 MGD

DIAM (IN)	VELOCITY (FPS)	VELOCITY HEAD (FT)	MINOR LOSSES (FT)	FRICTION LOSSES (FT)	HEAD REQUIRED (FT)
6.0	0.678E+00	0.714E-02	0.000E+00	0.925E+01	0.925E+01
8.0	0.381E+00	0.226E-02	0.000E+00	0.231E+01	0.231E+01
10.0	0.244E+00	0.925E-03	0.000E+00	0.799E+00	0.799E+00
12.0	0.169E+00	0.446E-03	0.000E+00	0.338E+00	0.338E+00

NO SECOND STAGE

CONSTRUCTION YEAR-STAGE 1	1990	
INTEREST RATE	9.250	%
DESIGN LIFE	30	YEARS
ENR CONSTRUCTION INDEX	4735.0	
LAND COST	0.000E+00	$
CITY MULTIPLIER	1.000	

TERRAIN TYPE--

DIAM (IN)	PIPE COSTS ($)	OTHER COSTS ($)	CONSTRUCTION COSTS ($)	OVERHEAD COSTS ($)	OPERATION & MAINT. ($/YR)
6.0	0.3416E+06	0.9133E+05	0.4330E+06	0.1082E+06	0.2035E+04
8.0	0.4550E+06	0.1174E+06	0.5724E+06	0.1431E+06	0.2288E+04
10.0	0.5682E+06	0.1436E+06	0.7118E+06	0.1780E+06	0.2545E+04
12.0	0.6813E+06	0.1701E+06	0.8514E+06	0.2128E+06	0.2804E+04

FORCE MAIN COST SUMMARY
MOD NO. 2

DIAM (IN)	CAPITAL COST ($)	O&M COST ($/YR)	AVERAGE ANNUAL COST ($/YR)
6.0	0.541E+06	0.203E+04	0.559E+05
8.0	0.715E+06	0.229E+04	0.735E+05
10.0	0.890E+06	0.254E+04	0.911E+05
12.0	0.106E+07	0.280E+04	0.109E+06

INPUT MAPS COMMAND
DESIGN DATA FOR FORCE MAIN 3

INPUT FORCE MAIN DATA
DATA PUT AT 14
INPUT MAPS COMMAND
DESIGN DATA FOR PUMP 3
INPUT PUMP DATA
DATA PUT AT 15

```
INPUT MAPS COMMAND
CONSTRUCT FORCE MAIN    3
DATA PUT AT  14
CONSTRUCT PUMP    3
DATA PUT AT  15



PIPE LINE WITH FORCE MOD    3
AND PIPE MOD    3
DETAILED OUTPUT, SUMMARY OR END?
```

OUTPUT FOR FORCE MAIN NO 3

AREA EAST FROM ROUTE 16B

MAXIMUM FLOW- STAGE 1	0.780E-01 MGD
AVERAGE FLOW- STAGE 1	0.520E-01 MGD
LENGTH	0.800E+04 FT
LENGTH	0.152E+01 MI
INITIAL ELEVATION	0.740E+03 FT
INITIAL PRESSURE HEAD	0.138E+03 FT
FINAL ELEVATION	0.170E+04 FT
FINAL PRESSURE HEAD	0.138E+03 FT
ROUGHNESS HEIGHT	0.400E-03 FT
ALLOWABLE PRESSURE IN PIPE	0.400E+03 FT
RECTANGULAR TRENCH	
DEPTH OF COVER	0.300E+01 FT
DRY SOIL CONDITIONS	
TYPE OF PIPE	
DUCTILE IRON PIPE IS USED FOR ALL DIAMETERS	

HYDRAULIC ANALYSIS AT PEAK FLOW (FIRST STAGE)
0.121 CFS 0.078 MGD

DIAM (IN)	VELOCITY (FPS)	VELOCITY HEAD (FT)	MINOR LOSSES (FT)	FRICTION LOSSES (FT)	HEAD REQUIRED (FT)
6.0	0.615E+00	0.587E-02	0.000E+00	0.270E+01	0.963E+03
8.0	0.346E+00	0.186E-02	0.000E+00	0.677E+00	0.961E+03
10.0	0.221E+00	0.761E-03	0.000E+00	0.235E+00	0.960E+03
12.0	0.154E+00	0.367E-03	0.000E+00	0.995E-01	0.960E+03

HYDRAULIC ANALYSIS AT AVERAGE FLOW (FIRST STAGE)
0.080 CFS 0.052 MGD

DIAM (IN)	VELOCITY (FPS)	VELOCITY HEAD (FT)	MINOR LOSSES (FT)	FRICTION LOSSES (FT)	HEAD REQUIRED (FT)
6.0	0.410E+00	0.261E-02	0.000E+00	0.131E+01	0.961E+03
8.0	0.230E+00	0.825E-03	0.000E+00	0.335E+00	0.960E+03
10.0	0.147E+00	0.338E-03	0.000E+00	0.117E+00	0.960E+03
12.0	0.102E+00	0.163E-03	0.000E+00	0.501E-01	0.960E+03

NO SECOND STAGE

CONSTRUCTION YEAR-STAGE 1	1990	
INTEREST RATE	9.250	%
DESIGN LIFE	30	YEARS
ENR CONSTRUCTION INDEX	4735.0	
LAND COST	0.000E+00	$
CITY MULTIPLIER	1.000	

TERRAIN TYPE--

DIAM (IN)	PIPE COSTS ($)	OTHER COSTS ($)	CONSTRUCTION COSTS ($)	OVERHEAD COSTS ($)	OPERATION & MAINT. ($/YR)
6.0	0.1188E+06	0.3177E+05	0.1506E+06	0.3765E+05	0.7078E+03
8.0	0.1583E+06	0.4083E+05	0.1991E+06	0.4977E+05	0.7957E+03
10.0	0.1976E+06	0.4996E+05	0.2476E+06	0.6190E+05	0.8851E+03
12.0	0.2370E+06	0.5915E+05	0.2961E+06	0.7403E+05	0.9754E+03

FORCE MAIN COST SUMMARY
MOD NO. 3

DIAM (IN)	CAPITAL COST ($)	O&M COST ($/YR)	AVERAGE ANNUAL COST ($/YR)
6.0	0.188E+06	0.708E+03	0.194E+05
8.0	0.249E+06	0.796E+03	0.256E+05
10.0	0.309E+06	0.885E+03	0.317E+05
12.0	0.370E+06	0.975E+03	0.378E+05

AREA EAST FROM ROUTE 16B

MAXIMUM FLOW(STAGE 1)	0.780E-01 MGD
AVERAGE FLOW(STAGE 1)	0.520E-01 MGD
REQUIRED HEAD BASED ON FORCE MAIN MOD	3
RAW OR TREATED WATER PUMPING	
YEAR BUILT	1990
YEAR SECOND STAGE BUILT	1990
DESIGN LIFE	30 YEARS
EFFICIENCY OF PUMP AND MOTOR	0.600E+02 PERCENT
MAXIMUM HEAD PER STATION	0.100E+04 FT
NO. OF STATIONS DETERMINED BY PROGRAM	
NO. PUMPS PER STATION-STAGE 1	2
NO WET WELL	
SIMPLE STRUCTURE	
DOWNTIME	0.0 PERCENT

ECONOMIC OUTPUT	
INTEREST RATE	0.925E+01 PERCENT
ENR INDEX	0.473E+04
CITY MULTIPLIER	0.100E+01
O&M WAGE	0.200E+02 $/HR
COST OF ELECTRICITY	0.100E+00 $/KWHR
COST OF LAND SITE IMPROVEMENT	0.000E+00 $

COST OF STRUCTURE AND SWITCHYARD FOR SINGLE STATION
COST BASED ON 0.08 MGD, BUILT IN 1990

DIAM	NO. OF STATIONS	POWER CAPACITY (KVA)	STRUCTURE COSTS ($)	SWITCHYARD COSTS ($)
6.0	1	0.206E+02	0.664E+04	0.000E+00
8.0	1	0.206E+02	0.664E+04	0.000E+00
10.0	1	0.205E+02	0.664E+04	0.000E+00
12.0	1	0.205E+02	0.664E+04	0.000E+00

COSTS FOR MECHANICAL AND ELECTRICAL EQUIPMENT FOR SINGLE STATION
COSTS FOR STAGE 1 BASED ON 0.780E-01 MGD, BUILT IN 1990

DIAM	HEAD PER STATION	MECHANIC COST	ELECTRIC COST	MISC COST	CONSTRUCT COST	OVERHEAD COST

(IN)	(FT)	($)	($)	($)	($)	($)
6.	0.973E+03	0.377E+05	0.000E+00	0.157E+05	0.780E+05	0.195E+05
8.	0.971E+03	0.376E+05	0.000E+00	0.157E+05	0.779E+05	0.195E+05
10.	0.970E+03	0.376E+05	0.000E+00	0.157E+05	0.779E+05	0.195E+05
12.	0.970E+03	0.376E+05	0.000E+00	0.157E+05	0.779E+05	0.195E+05

OPERATION AND MAINTENANCE COSTS FOR SINGLE PUMP STATION
COSTS FOR STAGE 1 BASED ON 0.520E-01 MGD FROM 1990 TO 2020
SUPPLY COST 0.415E+02 $/YR
LABOR COST 0.137E+04 $/YR

DIAM (IN)	HEAD REQUIRED (FT)	POWER REQUIRED (KWHR/YR)	POWER COST ($/YR)	TOTAL O&M ($/YR)
6.0	0.961E+03	0.962E+05	0.962E+04	0.110E+05
8.0	0.960E+03	0.961E+05	0.961E+04	0.110E+05
10.0	0.960E+03	0.961E+05	0.961E+04	0.110E+05
12.0	0.960E+03	0.961E+05	0.961E+04	0.110E+05

PUMP STATION COST SUMMARY
MOD NO. 3

DIAM (IN)	NO. OF STATIONS	STAGE 1 CAPITAL COST ($)	STAGE 1 O&M COST ($/YR)	STAGE 2 CAPITAL COST ($)	STAGE 2 O&M COST ($/YR)	AVERAGE ANNUAL COST ($/YR)
6.0	1	0.975E+05	0.110E+05	0.000E+00	0.000E+00	0.207E+05
8.0	1	0.974E+05	0.110E+05	0.000E+00	0.000E+00	0.207E+05
10.0	1	0.974E+05	0.110E+05	0.000E+00	0.000E+00	0.207E+05
12.0	1	0.974E+05	0.110E+05	0.000E+00	0.000E+00	0.207E+05

PIPELINE COST SUMMARY
FORCE MAIN MOD 3
PUMP STATION MOD 3

DIAM (IN)	AMORTIZED CONSTRUCTION COST(PIPE) ($/YR)	O&M COST (PIPE) ($/YR)	AMORTIZED CONSTRUCTION COST(PUMP) ($/YR)	O&M COST (PUMP) ($/YR)	AVERAGE ANNUAL COST ($/YR)
6.0	0.187E+05	0.708E+03	0.970E+04	0.110E+05	0.402E+05
8.0	0.248E+05	0.796E+03	0.969E+04	0.110E+05	0.463E+05
10.0	0.308E+05	0.885E+03	0.969E+04	0.110E+05	0.524E+05
12.0	0.368E+05	0.975E+03	0.969E+04	0.110E+05	0.585E+05

DETAILED OUTPUT, SUMMARY OR END?
INPUT MAPS COMMAND
DESIGN DATA FOR FORCE MAIN 4

INPUT FORCE MAIN DATA
DATA PUT AT 16
INPUT MAPS COMMAND
CONSTRUCT FORCE MAIN 4
DATA PUT AT 16

OUT FORCE MAIN 4

OUTPUT FOR FORCE MAIN NO 4

AREA EAST FROM ROUTE 16B

MAXIMUM FLOW- STAGE 1	0.330E-01 MGD
AVERAGE FLOW- STAGE 1	0.220E-01 MGD
LENGTH	0.205E+05 FT
LENGTH	0.388E+01 MI
INITIAL ELEVATION	0.170E+04 FT
INITIAL PRESSURE HEAD	0.138E+03 FT
FINAL ELEVATION	0.170E+04 FT
FINAL PRESSURE HEAD	0.138E+03 FT
ROUGHNESS HEIGHT	0.400E-03 FT
ALLOWABLE PRESSURE IN PIPE	0.400E+03 FT
RECTANGULAR TRENCH	
DEPTH OF COVER	0.300E+01 FT
DRY SOIL CONDITIONS	
TYPE OF PIPE	
DUCTILE IRON PIPE IS USED FOR ALL DIAMETERS	

HYDRAULIC ANALYSIS AT PEAK FLOW (FIRST STAGE)
0.051 CFS 0.033 MGD

DIAM (IN)	VELOCITY (FPS)	VELOCITY HEAD (FT)	MINOR LOSSES (FT)	FRICTION LOSSES (FT)	HEAD REQUIRED (FT)
6.0	0.260E+00	0.105E-02	0.000E+00	0.152E+01	0.152E+01
8.0	0.146E+00	0.332E-03	0.000E+00	0.396E+00	0.396E+00
10.0	0.936E-01	0.136E-03	0.000E+00	0.140E+00	0.140E+00
12.0	0.650E-01	0.657E-04	0.000E+00	0.605E-01	0.605E-01

HYDRAULIC ANALYSIS AT AVERAGE FLOW (FIRST STAGE)
0.034 CFS 0.022 MGD

DIAM (IN)	VELOCITY (FPS)	VELOCITY HEAD (FT)	MINOR LOSSES (FT)	FRICTION LOSSES (FT)	HEAD REQUIRED (FT)
6.0	0.173E+00	0.467E-03	0.000E+00	0.766E+00	0.766E+00
8.0	0.975E-01	0.148E-03	0.000E+00	0.202E+00	0.202E+00
10.0	0.624E-01	0.605E-04	0.000E+00	0.722E-01	0.722E-01
12.0	0.433E-01	0.292E-04	0.000E+00	0.313E-01	0.313E-01

NO SECOND STAGE

CONSTRUCTION YEAR-STAGE 1	1990	
INTEREST RATE	9.250	%
DESIGN LIFE	30	YEARS
ENR CONSTRUCTION INDEX	4735.0	
LAND COST	0.000E+00	$
CITY MULTIPLIER	1.000	
TERRAIN TYPE—		

DIAM (IN)	PIPE COSTS ($)	OTHER COSTS ($)	CONSTRUCTION COSTS ($)	OVERHEAD COSTS ($)	OPERATION & MAINT. ($/YR)
6.0	0.3045E+06	0.8140E+05	0.3859E+06	0.9648E+05	0.1814E+04
8.0	0.4055E+06	0.1046E+06	0.5102E+06	0.1275E+06	0.2039E+04
10.0	0.5064E+06	0.1280E+06	0.6344E+06	0.1586E+06	0.2268E+04
12.0	0.6073E+06	0.1516E+06	0.7588E+06	0.1897E+06	0.2499E+04

FORCE MAIN COST SUMMARY
MOD NO. 4

DIAM (IN)	CAPITAL COST ($)	O&M COST ($/YR)	AVERAGE ANNUAL COST ($/YR)
6.0	0.482E+06	0.181E+04	0.498E+05
8.0	0.638E+06	0.204E+04	0.655E+05
10.0	0.793E+06	0.227E+04	0.812E+05
12.0	0.949E+06	0.250E+04	0.969E+05

INPUT MAPS COMMAND
DESIGN DATA FOR FORCE MAIN 5

INPUT FORCE MAIN DATA
DATA PUT AT 17
INPUT MAPS COMMAND
DESIGN DATA FOR PUMP 5
INPUT PUMP DATA
DATA PUT AT 18

```
INPUT MAPS COMMAND
CONSTRUCT FORCE MAIN    5
DATA PUT AT  17
CONSTRUCT PUMP    5
DATA PUT AT  18



PIPE LINE WITH FORCE MOD    5
AND PIPE MOD    5
DETAILED OUTPUT, SUMMARY OR END?
```

OUTPUT FOR FORCE MAIN NO 5

AREA NORTH ALONG ROUTE 16

MAXIMUM FLOW- STAGE 1	0.380E-01 MGD
AVERAGE FLOW- STAGE 1	0.250E-01 MGD
LENGTH	0.160E+05 FT
LENGTH	0.303E+01 MI
INITIAL ELEVATION	0.740E+03 FT
INITIAL PRESSURE HEAD	0.138E+03 FT
FINAL ELEVATION	0.116E+04 FT
FINAL PRESSURE HEAD	0.138E+03 FT
ROUGHNESS HEIGHT	0.400E-03 FT
ALLOWABLE PRESSURE IN PIPE	0.400E+03 FT

RECTANGULAR TRENCH
DEPTH OF COVER 0.300E+01 FT
DRY SOIL CONDITIONS
TYPE OF PIPE
DUCTILE IRON PIPE IS USED FOR ALL DIAMETERS

HYDRAULIC ANALYSIS AT PEAK FLOW (FIRST STAGE)
0.059 CFS 0.038 MGD

DIAM (IN)	VELOCITY (FPS)	VELOCITY HEAD (FT)	MINOR LOSSES (FT)	FRICTION LOSSES (FT)	HEAD REQUIRED (FT)
6.0	0.299E+00	0.139E-02	0.000E+00	0.152E+01	0.422E+03
8.0	0.168E+00	0.441E-03	0.000E+00	0.392E+00	0.420E+03
10.0	0.108E+00	0.181E-03	0.000E+00	0.139E+00	0.420E+03
12.0	0.748E-01	0.871E-04	0.000E+00	0.595E-01	0.420E+03

HYDRAULIC ANALYSIS AT AVERAGE FLOW (FIRST STAGE)
0.039 CFS 0.025 MGD

DIAM (IN)	VELOCITY (FPS)	VELOCITY HEAD (FT)	MINOR LOSSES (FT)	FRICTION LOSSES (FT)	HEAD REQUIRED (FT)
6.0	0.197E+00	0.603E-03	0.000E+00	0.742E+00	0.421E+03
8.0	0.111E+00	0.191E-03	0.000E+00	0.194E+00	0.420E+03
10.0	0.709E-01	0.781E-04	0.000E+00	0.694E-01	0.420E+03
12.0	0.492E-01	0.377E-04	0.000E+00	0.300E-01	0.420E+03

NO SECOND STAGE

CONSTRUCTION YEAR-STAGE 1	1990	
INTEREST RATE	9.250	%
DESIGN LIFE	30	YEARS
ENR CONSTRUCTION INDEX	4735.0	
LAND COST	0.000E+00	$
CITY MULTIPLIER	1.000	
TERRAIN TYPE--		

DIAM (IN)	PIPE COSTS ($)	OTHER COSTS ($)	CONSTRUCTION COSTS ($)	OVERHEAD COSTS ($)	OPERATION & MAINT. ($/YR)
6.0	0.2377E+06	0.6354E+05	0.3012E+06	0.7530E+05	0.1416E+04
8.0	0.3165E+06	0.8166E+05	0.3982E+06	0.9954E+05	0.1591E+04
10.0	0.3953E+06	0.9992E+05	0.4952E+06	0.1238E+06	0.1770E+04
12.0	0.4740E+06	0.1183E+06	0.5923E+06	0.1481E+06	0.1951E+04

FORCE MAIN COST SUMMARY
MOD NO. 5

DIAM (IN)	CAPITAL COST ($)	O&M COST ($/YR)	AVERAGE ANNUAL COST ($/YR)
6.0	0.377E+06	0.142E+04	0.389E+05
8.0	0.498E+06	0.159E+04	0.511E+05
10.0	0.619E+06	0.177E+04	0.634E+05
12.0	0.740E+06	0.195E+04	0.756E+05

OUTPUT FOR PUMP STATION NO. 5

AREA NORTH ALONG ROUTE 16

MAXIMUM FLOW(STAGE 1)	0.380E-01 MGD
AVERAGE FLOW(STAGE 1)	0.250E-01 MGD
REQUIRED HEAD BASED ON FORCE MAIN MOD	5
RAW OR TREATED WATER PUMPING	
YEAR BUILT	1990
YEAR SECOND STAGE BUILT	1990
DESIGN LIFE	30 YEARS
EFFICIENCY OF PUMP AND MOTOR	0.600E+02 PERCENT
MAXIMUM HEAD PER STATION	0.100E+04 FT
NO. OF STATIONS DETERMINED BY PROGRAM	
NO. PUMPS PER STATION-STAGE 1	2
NO WET WELL	
SIMPLE STRUCTURE	
DOWNTIME	0.0 PERCENT

ECONOMIC OUTPUT

INTEREST RATE	0.925E+01 PERCENT
ENR INDEX	0.473E+04
CITY MULTIPLIER	0.100E+01
O&M WAGE	0.200E+02 $/HR
COST OF ELECTRICITY	0.100E+00 $/KWHR
COST OF LAND SITE IMPROVEMENT	0.000E+00 $

COST OF STRUCTURE AND SWITCHYARD FOR SINGLE STATION
COST BASED ON 0.04 MGD, BUILT IN 1990

DIAM	NO. OF STATIONS	POWER CAPACITY (KVA)	STRUCTURE COSTS ($)	SWITCHYARD COSTS ($)
6.0	1	0.445E+01	0.516E+04	0.000E+00
8.0	1	0.444E+01	0.516E+04	0.000E+00
10.0	1	0.444E+01	0.516E+04	0.000E+00
12.0	1	0.444E+01	0.516E+04	0.000E+00

COSTS FOR MECHANICAL AND ELECTRICAL EQUIPMENT FOR SINGLE STATION
COSTS FOR STAGE 1 BASED ON 0.380E-01 MGD, BUILT IN 1990

DIAM	HEAD PER STATION	MECHANIC COST	ELECTRIC COST	MISC COST	CONSTRUCT COST	OVERHEAD COST

(IN)	(FT)	($)	($)	($)	($)	($)
6.	0.432E+03	0.218E+05	0.000E+00	0.113E+05	0.498E+05	0.124E+05
8.	0.430E+03	0.218E+05	0.000E+00	0.113E+05	0.497E+05	0.124E+05
10.	0.430E+03	0.218E+05	0.000E+00	0.113E+05	0.497E+05	0.124E+05
12.	0.430E+03	0.218E+05	0.000E+00	0.113E+05	0.497E+05	0.124E+05

OPERATION AND MAINTENANCE COSTS FOR SINGLE PUMP STATION
COSTS FOR STAGE 1 BASED ON 0.250E-01 MGD FROM 1990 TO 2020
SUPPLY COST 0.209E+02 $/YR
LABOR COST 0.895E+03 $/YR

DIAM (IN)	HEAD REQUIRED (FT)	POWER REQUIRED (KWHR/YR)	POWER COST ($/YR)	TOTAL O&M ($/YR)
6.0	0.421E+03	0.205E+05	0.205E+04	0.297E+04
8.0	0.420E+03	0.205E+05	0.205E+04	0.296E+04
10.0	0.420E+03	0.205E+05	0.205E+04	0.296E+04
12.0	0.420E+03	0.205E+05	0.205E+04	0.296E+04

PUMP STATION COST SUMMARY
MOD NO. 5

DIAM (IN)	NO. OF STATIONS	STAGE 1 CAPITAL COST ($)	STAGE 1 O&M COST ($/YR)	STAGE 2 CAPITAL COST ($)	STAGE 2 O&M COST ($/YR)	AVERAGE ANNUAL COST ($/YR)
6.0	1	0.622E+05	0.297E+04	0.000E+00	0.000E+00	0.916E+04
8.0	1	0.622E+05	0.296E+04	0.000E+00	0.000E+00	0.915E+04
10.0	1	0.622E+05	0.296E+04	0.000E+00	0.000E+00	0.915E+04
12.0	1	0.621E+05	0.296E+04	0.000E+00	0.000E+00	0.915E+04

PIPELINE COST SUMMARY
FORCE MAIN MOD 5
PUMP STATION MOD 5

DIAM (IN)	AMORTIZED CONSTRUCTION COST(PIPE) ($/YR)	O&M COST (PIPE) ($/YR)	AMORTIZED CONSTRUCTION COST(PUMP) ($/YR)	O&M COST (PUMP) ($/YR)	AVERAGE ANNUAL COST ($/YR)
6.0	0.375E+05	0.142E+04	0.619E+04	0.297E+04	0.480E+05
8.0	0.495E+05	0.159E+04	0.619E+04	0.296E+04	0.603E+05
10.0	0.616E+05	0.177E+04	0.618E+04	0.296E+04	0.725E+05
12.0	0.737E+05	0.195E+04	0.618E+04	0.296E+04	0.848E+05

DETAILED OUTPUT, SUMMARY OR END?
INPUT MAPS COMMAND
DESIGN DATA FOR FORCE MAIN 6

INPUT FORCE MAIN DATA
DATA PUT AT 19
INPUT MAPS COMMAND
CONSTRUCT FORCE MAIN 6
DATA PUT AT 19

OUT FORCE MAIN 6

OUTPUT FOR FORCE MAIN NO 6

AREA NORTH ALONG ROUTE 16

MAXIMUM FLOW- STAGE 1	0.160E-01 MGD
AVERAGE FLOW- STAGE 1	0.110E-01 MGD
LENGTH	0.600E+04 FT
LENGTH	0.114E+01 MI
INITIAL ELEVATION	0.116E+04 FT
INITIAL PRESSURE HEAD	0.138E+03 FT
FINAL ELEVATION	0.116E+04 FT
FINAL PRESSURE HEAD	0.138E+03 FT
ROUGHNESS HEIGHT	0.400E-03 FT
ALLOWABLE PRESSURE IN PIPE	0.400E+03 FT

RECTANGULAR TRENCH
DEPTH OF COVER 0.300E+01 FT
DRY SOIL CONDITIONS
TYPE OF PIPE
DUCTILE IRON PIPE IS USED FOR ALL DIAMETERS

HYDRAULIC ANALYSIS AT PEAK FLOW (FIRST STAGE)
0.025 CFS 0.016 MGD

DIAM (IN)	VELOCITY (FPS)	VELOCITY HEAD (FT)	MINOR LOSSES (FT)	FRICTION LOSSES (FT)	HEAD REQUIRED (FT)
6.0	0.126E+00	0.247E-03	0.000E+00	0.132E+00	0.132E+00
8.0	0.709E-01	0.781E-04	0.000E+00	0.351E-01	0.351E-01
10.0	0.454E-01	0.320E-04	0.000E+00	0.127E-01	0.127E-01
12.0	0.315E-01	0.154E-04	0.000E+00	0.550E-02	0.550E-02

HYDRAULIC ANALYSIS AT AVERAGE FLOW (FIRST STAGE)
0.017 CFS 0.011 MGD

DIAM (IN)	VELOCITY (FPS)	VELOCITY HEAD (FT)	MINOR LOSSES (FT)	FRICTION LOSSES (FT)	HEAD REQUIRED (FT)
6.0	0.867E-01	0.117E-03	0.000E+00	0.717E-01	0.717E-01
8.0	0.488E-01	0.369E-04	0.000E+00	0.193E-01	0.193E-01
10.0	0.312E-01	0.151E-04	0.000E+00	0.699E-02	0.699E-02
12.0	0.217E-01	0.730E-05	0.000E+00	0.305E-02	0.305E-02

NO SECOND STAGE

CONSTRUCTION YEAR-STAGE 1	1990	
INTEREST RATE	9.250	%
DESIGN LIFE	30	YEARS
ENR CONSTRUCTION INDEX	4735.0	
LAND COST	0.000E+00	$
CITY MULTIPLIER	1.000	
TERRAIN TYPE--		

DIAM (IN)	PIPE COSTS ($)	OTHER COSTS ($)	CONSTRUCTION COSTS ($)	OVERHEAD COSTS ($)	OPERATION & MAINT. ($/YR)
6.0	0.8913E+05	0.2383E+05	0.1130E+06	0.2824E+05	0.5309E+03
8.0	0.1187E+06	0.3062E+05	0.1493E+06	0.3733E+05	0.5968E+03
10.0	0.1482E+06	0.3747E+05	0.1857E+06	0.4642E+05	0.6638E+03
12.0	0.1777E+06	0.4436E+05	0.2221E+06	0.5552E+05	0.7315E+03

FORCE MAIN COST SUMMARY
MOD NO. 6

DIAM (IN)	CAPITAL COST ($)	O&M COST ($/YR)	AVERAGE ANNUAL COST ($/YR)
6.0	0.141E+06	0.531E+03	0.146E+05
8.0	0.187E+06	0.597E+03	0.192E+05
10.0	0.232E+06	0.664E+03	0.238E+05
12.0	0.278E+06	0.732E+03	0.284E+05

INPUT MAPS COMMAND
STOP - NORMAL TERMINATION

Appendix E
Conway Village Fire Precinct

CONWAY VILLAGE FIRE PRECINCT WORKSHEET CALCULATIONS

EXISTING CONDITIONS		# of service conn.	Estimated Ave Day Demand (Kgal/d)	Reported Yield (Kgal/d)	Estimated Elevation (ft. NGVD)	Reported Storage (gal/tank)
Conway Village Fire Precinct		730	794	1800	460	250000
SMALL SYSTEMS Map#/System Name(1)	EPA #	# of units approved	Calc.(2) Ave Day Demand (Kgal/d)	Reported Capacity (Kgal/d)	Estimated Elevation of system (ft. NGVD)	Estimated dist pipe Length (ft.)
AREA EAST ALONG ROUTE 302						
45.Deerpath	C0510010	47	17.6	70.6	640	10000
46.Davis Hill	C0510020	248	93.0	129.6	540	3000
50.Conway East	C0512040	32	12.0	17.0	500	2000
54.Hunting Ridge	C0512080	65	24.4	259.0	430	2000
55.Lake Pine Condos	C0512090	14	5.3	28.8	460	500
56.North Pines	C0512110	29	10.9	86.4	420	1000
57.Saco R.Forest	C0512120	20	7.5	26.0	450	1000
58.Woodland Grove	C0512130	59	22.1	31.7	600	3500
59.South Pines	C0512140	28	10.5	72.0	440	1000
61.Old Mill Est.	C0512160	60	22.5	109.0	460	500
62.Oak Wood Heights	C0512170	63	23.6	43.0	540	4000
63.Saco Pines	C0512180	20	7.5	38.9	420	3000
67.Melody Pines	C0512230	50	18.8	31.7	460	4000
68.Saco Woods	C0512250	90	33.8	112.0	460	500
Subtotal:		825	309	1056		36000
transmission main along route 302						28000

EXISTING DEMAND IN PRECINCT=	794	(Kgal/d)
CALC. ADDITIONAL DEMAND =	309	(Kgal/d)
EXISTING SUPPLY IN PRECINCT	1800	(Kgal/d)
DEFICIT =	0	(Kgal/d)

(1) Data was obtained from NH DES DWS files
(2) Based on (# of units x 2.5 bedrooms/unit x150 = gpd)

```
MAPS VERSION 26 JAN 87
INITIALIZE OR RESTORE?
INPUT MAPS COMMAND
ECONOMIC DATA GOES HERE

INPUT ECONOMIC DATA
DATA PUT AT    6
INPUT MAPS COMMAND
TITL IS INAPPROPRIATE COMMAND-TRY AGAIN
INPUT MAPS COMMAND
DATA FOR STORAGE TANK    1
INPUT STORAGE TANK DATA
DATA PUT AT    8
INPUT MAPS COMMAND
CONSTRUCT STORAGE TANK    1
DATA PUT AT    8



STORAGE TANK OUTPUT MOD    1
STORAGE TANK MOD  1



VOLUME                                    0.100E+01 MG
CONCRETE TANK                             0.522E+06 $

ECONOMIC FACTORS
DESIGN LIFE                                 30  YEARS
YEAR BUILT                                  1990
ENR INDEX                                 0.473E+04
INTEREST RATE                             9.25 PERCENT
INFLATION RATE                            0.00 PERCENT
CITY MULTIPLIER                           0.100E+01
O&M WAGE RATE                             0.200E+02 $/HR

    COST SUMMARY
              COST IN 1990  COST IN 1990  COST IN 1990
              DOLLARS       DOLLARS       DOLLARS
              BUILT IN 1990 BUILT IN 1990 BUILT IN 1990
                                          W/ 0.0% INFLATION
```

CONSTRUCTION($)	0.522E+06	0.522E+06	0.522E+06
INDIRECT CONS($)	0.131E+06	0.131E+06	0.131E+06
CAPITAL COST($)	0.653E+06	0.653E+06	0.653E+06
AMORTIZED($/YR)	0.650E+05	0.650E+05	0.650E+05
LABOR COST($/YR)	0.000E+00	0.000E+00	0.000E+00
SUPPLY COST($/YR)	0.000E+00	0.000E+00	0.000E+00
POWER($/YR)	0.000E+00	0.000E+00	0.000E+00
TOTAL O&M($/YR)	0.522E+04	0.522E+04	0.522E+04
AVE ANNUAL($/YR)	0.702E+05	0.702E+05	0.702E+05

****

INPUT MAPS COMMAND
DESIGN DATA FOR FORCE MAIN 1

INPUT FORCE MAIN DATA
DATA PUT AT 10
INPUT MAPS COMMAND
DESIGN DATA FOR PUMP 1
INPUT PUMP DATA
DATA PUT AT 12
INPUT MAPS COMMAND
CONSTRUCT FORCE MAIN 1
DATA PUT AT 10
CONSTRUCT PUMP 1
DATA PUT AT 12

PIPE LINE WITH FORCE MOD 1
AND PIPE MOD 1
DETAILED OUTPUT, SUMMARY OR END?

OUTPUT FOR FORCE MAIN NO 1

AREA EAST OF CVFP

MAXIMUM FLOW- STAGE 1	0.464E+00 MGD
AVERAGE FLOW- STAGE 1	0.309E+00 MGD
LENGTH	0.280E+05 FT
LENGTH	0.530E+01 MI
INITIAL ELEVATION	0.460E+03 FT
INITIAL PRESSURE HEAD	0.138E+03 FT
FINAL ELEVATION	0.640E+03 FT
FINAL PRESSURE HEAD	0.138E+03 FT
ROUGHNESS HEIGHT	0.400E-03 FT
ALLOWABLE PRESSURE IN PIPE	0.400E+03 FT

RECTANGULAR TRENCH
DEPTH OF COVER 0.300E+01 FT
DRY SOIL CONDITIONS
TYPE OF PIPE
DUCTILE IRON PIPE IS USED FOR ALL DIAMETERS

HYDRAULIC ANALYSIS AT PEAK FLOW (FIRST STAGE)
0.718 CFS 0.464 MGD

DIAM (IN)	VELOCITY (FPS)	VELOCITY HEAD (FT)	MINOR LOSSES (FT)	FRICTION LOSSES (FT)	HEAD REQUIRED (FT)
6.0	0.366E+01	0.208E+00	0.000E+00	0.261E+03	0.441E+03
8.0	0.206E+01	0.657E-01	0.000E+00	0.615E+02	0.241E+03
10.0	0.132E+01	0.269E-01	0.000E+00	0.203E+02	0.200E+03
12.0	0.914E+00	0.130E-01	0.000E+00	0.827E+01	0.188E+03

HYDRAULIC ANALYSIS AT AVERAGE FLOW (FIRST STAGE)
0.478 CFS 0.309 MGD

DIAM (IN)	VELOCITY (FPS)	VELOCITY HEAD (FT)	MINOR LOSSES (FT)	FRICTION LOSSES (FT)	HEAD REQUIRED (FT)
6.0	0.243E+01	0.921E-01	0.000E+00	0.120E+03	0.300E+03
8.0	0.137E+01	0.291E-01	0.000E+00	0.287E+02	0.209E+03
10.0	0.876E+00	0.119E-01	0.000E+00	0.957E+01	0.190E+03
12.0	0.609E+00	0.576E-02	0.000E+00	0.393E+01	0.184E+03

NO SECOND STAGE

CONSTRUCTION YEAR-STAGE 1	1990	
INTEREST RATE	9.250	%
DESIGN LIFE	30	YEARS
ENR CONSTRUCTION INDEX	4735.0	
LAND COST	0.000E+00	$
CITY MULTIPLIER	1.000	
TERRAIN TYPE--		

DIAM (IN)	PIPE COSTS ($)	OTHER COSTS ($)	CONSTRUCTION COSTS ($)	OVERHEAD COSTS ($)	OPERATION & MAINT. ($/YR)
6.0	0.4159E+06	0.1112E+06	0.5271E+06	0.1318E+06	0.2477E+04
8.0	0.5539E+06	0.1429E+06	0.6968E+06	0.1742E+06	0.2785E+04
10.0	0.6917E+06	0.1749E+06	0.8666E+06	0.2166E+06	0.3098E+04
12.0	0.8294E+06	0.2070E+06	0.1036E+07	0.2591E+06	0.3414E+04

FORCE MAIN COST SUMMARY
MOD NO. 1

DIAM (IN)	CAPITAL COST ($)	O&M COST ($/YR)	AVERAGE ANNUAL COST ($/YR)
6.0	0.659E+06	0.248E+04	0.680E+05
8.0	0.871E+06	0.278E+04	0.894E+05
10.0	0.108E+07	0.310E+04	0.111E+06
12.0	0.130E+07	0.341E+04	0.132E+06

OUTPUT FOR PUMP STATION NO. 1

AREA EAST OF CVFP

MAXIMUM FLOW(STAGE 1)	0.464E+00 MGD
AVERAGE FLOW(STAGE 1)	0.309E+00 MGD
REQUIRED HEAD BASED ON FORCE MAIN MOD	1
RAW OR TREATED WATER PUMPING	
YEAR BUILT	1990
YEAR SECOND STAGE BUILT	1990
DESIGN LIFE	30 YEARS
EFFICIENCY OF PUMP AND MOTOR	0.600E+02 PERCENT
MAXIMUM HEAD PER STATION	0.100E+04 FT
NO. OF STATIONS DETERMINED BY PROGRAM	
NO. PUMPS PER STATION-STAGE 1	2
NO WET WELL	
SIMPLE STRUCTURE	
DOWNTIME	0.0 PERCENT

ECONOMIC OUTPUT

INTEREST RATE	0.925E+01 PERCENT
ENR INDEX	0.473E+04
CITY MULTIPLIER	0.100E+01
O&M WAGE	0.200E+02 $/HR
COST OF ELECTRICITY	0.100E+00 $/KWHR
COST OF LAND SITE IMPROVEMENT	0.000E+00 $

COST OF STRUCTURE AND SWITCHYARD FOR SINGLE STATION
COST BASED ON 0.46 MGD, BUILT IN 1990

DIAM	NO. OF STATIONS	POWER CAPACITY (KVA)	STRUCTURE COSTS ($)	SWITCHYARD COSTS ($)
6.0	1	0.568E+02	0.124E+05	0.000E+00
8.0	1	0.317E+02	0.124E+05	0.000E+00
10.0	1	0.265E+02	0.124E+05	0.000E+00
12.0	1	0.250E+02	0.124E+05	0.000E+00

COSTS FOR MECHANICAL AND ELECTRICAL EQUIPMENT FOR SINGLE STATION
COSTS FOR STAGE 1 BASED ON 0.464E+00 MGD, BUILT IN 1990

DIAM	HEAD PER STATION	MECHANIC COST	ELECTRIC COST	MISC COST	CONSTRUCT COST	OVERHEAD COST

(IN)	(FT)	($)	($)	($)	($)	($)
6.	0.451E+03	0.431E+05	0.000E+00	0.354E+05	0.118E+06	0.295E+05
8.	0.251E+03	0.334E+05	0.000E+00	0.354E+05	0.106E+06	0.264E+05
10.	0.210E+03	0.308E+05	0.000E+00	0.354E+05	0.102E+06	0.256E+05
12.	0.198E+03	0.301E+05	0.000E+00	0.354E+05	0.101E+06	0.253E+05

OPERATION AND MAINTENANCE COSTS FOR SINGLE PUMP STATION
COSTS FOR STAGE 1 BASED ON 0.309E+00 MGD FROM 1990 TO 2020
SUPPLY COST 0.220E+03 $/YR
LABOR COST 0.385E+04 $/YR

DIAM (IN)	HEAD REQUIRED (FT)	POWER REQUIRED (KWHR/YR)	POWER COST ($/YR)	TOTAL O&M ($/YR)
6.0	0.300E+03	0.183E+06	0.183E+05	0.223E+05
8.0	0.209E+03	0.129E+06	0.129E+05	0.169E+05
10.0	0.190E+03	0.117E+06	0.117E+05	0.158E+05
12.0	0.184E+03	0.114E+06	0.114E+05	0.155E+05

PUMP STATION COST SUMMARY
MOD NO. 1

DIAM (IN)	NO. OF STATIONS	STAGE 1 CAPITAL COST ($)	STAGE 1 O&M COST ($/YR)	STAGE 2 CAPITAL COST ($)	STAGE 2 O&M COST ($/YR)	AVERAGE ANNUAL COST ($/YR)
6.0	1	0.148E+06	0.223E+05	0.000E+00	0.000E+00	0.370E+05
8.0	1	0.132E+06	0.169E+05	0.000E+00	0.000E+00	0.301E+05
10.0	1	0.128E+06	0.158E+05	0.000E+00	0.000E+00	0.285E+05
12.0	1	0.127E+06	0.155E+05	0.000E+00	0.000E+00	0.281E+05

PIPELINE COST SUMMARY
FORCE MAIN MOD 1
PUMP STATION MOD 1

DIAM (IN)	AMORTIZED CONSTRUCTION COST(PIPE) ($/YR)	O&M COST (PIPE) ($/YR)	AMORTIZED CONSTRUCTION COST(PUMP) ($/YR)	O&M COST (PUMP) ($/YR)	AVERAGE ANNUAL COST ($/YR)
6.0	0.656E+05	0.248E+04	0.147E+05	0.223E+05	0.105E+06
8.0	0.867E+05	0.278E+04	0.131E+05	0.169E+05	0.120E+06
10.0	0.108E+06	0.310E+04	0.127E+05	0.158E+05	0.139E+06
12.0	0.129E+06	0.341E+04	0.126E+05	0.155E+05	0.160E+06

DETAILED OUTPUT, SUMMARY OR END?
INPUT MAPS COMMAND
DESIGN DATA FOR FORCE MAIN 3

INPUT FORCE MAIN DATA
DATA PUT AT 13
INPUT MAPS COMMAND
CONSTRUCT FORCE MAIN 3
DATA PUT AT 13

OUT FORCE MAIN 3

OUTPUT FOR FORCE MAIN NO 3

AREA EAST OF CVFP

MAXIMUM FLOW- STAGE 1	0.139E+00 MGD
AVERAGE FLOW- STAGE 1	0.930E-01 MGD
LENGTH	0.360E+05 FT
LENGTH	0.682E+01 MI
INITIAL ELEVATION	0.640E+03 FT
INITIAL PRESSURE HEAD	0.138E+03 FT
FINAL ELEVATION	0.640E+03 FT
FINAL PRESSURE HEAD	0.138E+03 FT
ROUGHNESS HEIGHT	0.400E-03 FT
ALLOWABLE PRESSURE IN PIPE	0.400E+03 FT

RECTANGULAR TRENCH
DEPTH OF COVER 0.300E+01 FT
DRY SOIL CONDITIONS
TYPE OF PIPE
DUCTILE IRON PIPE IS USED FOR ALL DIAMETERS

HYDRAULIC ANALYSIS AT PEAK FLOW (FIRST STAGE)
0.215 CFS 0.139 MGD

DIAM (IN)	VELOCITY (FPS)	VELOCITY HEAD (FT)	MINOR LOSSES (FT)	FRICTION LOSSES (FT)	HEAD REQUIRED (FT)
6.0	0.110E+01	0.186E-01	0.000E+00	0.347E+02	0.347E+02
8.0	0.616E+00	0.590E-02	0.000E+00	0.853E+01	0.853E+01
10.0	0.394E+00	0.242E-02	0.000E+00	0.291E+01	0.291E+01
12.0	0.274E+00	0.117E-02	0.000E+00	0.122E+01	0.122E+01

HYDRAULIC ANALYSIS AT AVERAGE FLOW (FIRST STAGE)
0.144 CFS 0.093 MGD

DIAM (IN)	VELOCITY (FPS)	VELOCITY HEAD (FT)	MINOR LOSSES (FT)	FRICTION LOSSES (FT)	HEAD REQUIRED (FT)
6.0	0.733E+00	0.834E-02	0.000E+00	0.167E+02	0.167E+02
8.0	0.412E+00	0.264E-02	0.000E+00	0.416E+01	0.416E+01
10.0	0.264E+00	0.108E-02	0.000E+00	0.143E+01	0.143E+01
12.0	0.183E+00	0.522E-03	0.000E+00	0.605E+00	0.605E+00

NO SECOND STAGE

CONSTRUCTION YEAR-STAGE 1	1990	
INTEREST RATE	9.250	%
DESIGN LIFE	30	YEARS
ENR CONSTRUCTION INDEX	4735.0	
LAND COST	0.000E+00	$
CITY MULTIPLIER	1.000	
TERRAIN TYPE--		

DIAM (IN)	PIPE COSTS ($)	OTHER COSTS ($)	CONSTRUCTION COSTS ($)	OVERHEAD COSTS ($)	OPERATION & MAINT. ($/YR)
6.0	0.5348E+06	0.1430E+06	0.6777E+06	0.1694E+06	0.3185E+04
8.0	0.7121E+06	0.1837E+06	0.8959E+06	0.2240E+06	0.3581E+04
10.0	0.8893E+06	0.2248E+06	0.1114E+07	0.2785E+06	0.3983E+04
12.0	0.1066E+07	0.2662E+06	0.1333E+07	0.3331E+06	0.4389E+04

FORCE MAIN COST SUMMARY
MOD NO. 3

DIAM (IN)	CAPITAL COST ($)	O&M COST ($/YR)	AVERAGE ANNUAL COST ($/YR)
6.0	0.847E+06	0.319E+04	0.875E+05
8.0	0.112E+07	0.358E+04	0.115E+06
10.0	0.139E+07	0.398E+04	0.143E+06
12.0	0.167E+07	0.439E+04	0.170E+06

INPUT MAPS COMMAND
STOP - NORMAL TERMINATION

Appendix F
North Conway Water Precinct

NORTH CONWAY WATER PRECINCT WORKSHEET CALCULATIONS

EXISTING CONDITIONS	# of service conn.	Estimated Ave Day Demand (kgal/d)	Reported Yield (kgal/d)	Estimated Elevation of service area (ft. NGVD)	Reported Storage
North Conway Water District	2000	1000	2700	500	2 tanks 2,000,000 @730 ft. 2,000,000 @810 ft.

SMALL SYSTEMS Map#/name of system (1)	EPA #	# of units approved	Calc(2) Ave Day Demand (kgal/d)	Reported Well Capacity (kgal/d)	Estimated Elevation of System (ft. NGVD)	Estimated dist.pipe length (ft.)
AREA WEST OF	SACO RIVER					
47.Birch Hill East	C0512010	150	56.3	158.0	640	2000
48.Birch Hill West	C0512020	45	16.9	197.0	560	3500
49.Cathedral Lake	C0512030	55	20.6	16.0	500	1000
51.Echo Lake	C0512050	52	19.5	68.0	500	500
52.Forest Edge	C0512060	77	28.9	36.0	660	4500
53.Forest Park	C0512070	26	9.8	29.0	500	2000
60.Deerbrook	C0512150	16	6.0	na	500	2500
64.Brook View	C0512190	16	6.0	33.0	500	1000
65.Cedar Creek	C0512200	42	15.8	36.7	500	4500
66.Near Ledge	C0512210	25	9.4	79.0	500	9000
Subtotal:		504	189	653		30500
transmission main to west						13000

EXISTING DEMAND IN PRECINCT	1000
CALC. ADDITIONAL DEMAND =	189
EXISTING SUPPLY IN PRECINCT	2700
DEFICIT =	0

(1) Data was obtained from NH DES DWS files
(2) Based (# of units 2.5 bedrooms/unit x 150 = gpd)

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MAPS VERSION 26 JAN 87
INITIALIZE OR RESTORE?
INPUT MAPS COMMAND
ECONOMIC DATA GOES HERE

INPUT ECONOMIC DATA
DATA PUT AT    6
INPUT MAPS COMMAND
DESIGN DATA FOR FORCE MAIN    1

INPUT FORCE MAIN DATA
DATA PUT AT    8
INPUT MAPS COMMAND
DESIGN DATA FOR PUMP    1
INPUT PUMP DATA
DATA PUT AT   10
INPUT MAPS COMMAND
CONSTRUCT FORCE MAIN    1
DATA PUT AT    8
CONSTRUCT PUMP    1
DATA PUT AT   10



PIPE LINE WITH FORCE MOD    1
AND PIPE MOD    1
DETAILED OUTPUT, SUMMARY OR END?
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OUTPUT FOR FORCE MAIN NO 1

AREA WEST OF SACO RIVER

MAXIMUM FLOW- STAGE 1	0.284E+00 MGD
AVERAGE FLOW- STAGE 1	0.189E+00 MGD
LENGTH	0.130E+05 FT
LENGTH	0.246E+01 MI
INITIAL ELEVATION	0.500E+03 FT
INITIAL PRESSURE HEAD	0.138E+03 FT
FINAL ELEVATION	0.660E+03 FT
FINAL PRESSURE HEAD	0.138E+03 FT
ROUGHNESS HEIGHT	0.400E-03 FT
ALLOWABLE PRESSURE IN PIPE	0.400E+03 FT

RECTANGULAR TRENCH
DEPTH OF COVER 0.300E+01 FT
DRY SOIL CONDITIONS
TYPE OF PIPE
DUCTILE IRON PIPE IS USED FOR ALL DIAMETERS

HYDRAULIC ANALYSIS AT PEAK FLOW (FIRST STAGE)
0.439 CFS 0.284 MGD

DIAM (IN)	VELOCITY (FPS)	VELOCITY HEAD (FT)	MINOR LOSSES (FT)	FRICTION LOSSES (FT)	HEAD REQUIRED (FT)
6.0	0.224E+01	0.778E-01	0.000E+00	0.476E+02	0.208E+03
8.0	0.126E+01	0.246E-01	0.000E+00	0.114E+02	0.171E+03
10.0	0.806E+00	0.101E-01	0.000E+00	0.381E+01	0.164E+03
12.0	0.559E+00	0.486E-02	0.000E+00	0.157E+01	0.162E+03

HYDRAULIC ANALYSIS AT AVERAGE FLOW (FIRST STAGE)
0.292 CFS 0.189 MGD

DIAM (IN)	VELOCITY (FPS)	VELOCITY HEAD (FT)	MINOR LOSSES (FT)	FRICTION LOSSES (FT)	HEAD REQUIRED (FT)
6.0	0.149E+01	0.345E-01	0.000E+00	0.222E+02	0.182E+03
8.0	0.838E+00	0.109E-01	0.000E+00	0.538E+01	0.165E+03
10.0	0.536E+00	0.447E-02	0.000E+00	0.182E+01	0.162E+03
12.0	0.372E+00	0.215E-02	0.000E+00	0.755E+00	0.161E+03

NO SECOND STAGE

CONSTRUCTION YEAR-STAGE 1	1990	
INTEREST RATE	9.250	%
DESIGN LIFE	30	YEARS
ENR CONSTRUCTION INDEX	4735.0	
LAND COST	0.000E+00	$
CITY MULTIPLIER	1.000	
TERRAIN TYPE--		

DIAM (IN)	PIPE COSTS ($)	OTHER COSTS ($)	CONSTRUCTION COSTS ($)	OVERHEAD COSTS ($)	OPERATION & MAINT. ($/YR)
6.0	0.1931E+06	0.5162E+05	0.2447E+06	0.6118E+05	0.1150E+04
8.0	0.2572E+06	0.6635E+05	0.3235E+06	0.8088E+05	0.1293E+04
10.0	0.3212E+06	0.8118E+05	0.4023E+06	0.1006E+06	0.1438E+04
12.0	0.3851E+06	0.9612E+05	0.4812E+06	0.1203E+06	0.1585E+04

FORCE MAIN COST SUMMARY
MOD NO. 1

DIAM (IN)	CAPITAL COST ($)	O&M COST ($/YR)	AVERAGE ANNUAL COST ($/YR)
6.0	0.306E+06	0.115E+04	0.316E+05
8.0	0.404E+06	0.129E+04	0.415E+05
10.0	0.503E+06	0.144E+04	0.515E+05
12.0	0.602E+06	0.158E+04	0.614E+05

OUTPUT FOR PUMP STATION NO. 1

AREA WEST OF SACO RIVER

MAXIMUM FLOW(STAGE 1)	0.284E+00 MGD
AVERAGE FLOW(STAGE 1)	0.189E+00 MGD
REQUIRED HEAD BASED ON FORCE MAIN MOD	1
RAW OR TREATED WATER PUMPING	
YEAR BUILT	1990
YEAR SECOND STAGE BUILT	1990
DESIGN LIFE	30 YEARS
EFFICIENCY OF PUMP AND MOTOR	0.600E+02 PERCENT
MAXIMUM HEAD PER STATION	0.100E+04 FT
NO. OF STATIONS DETERMINED BY PROGRAM	
NO. PUMPS PER STATION-STAGE 1	2
NO WET WELL	
SIMPLE STRUCTURE	
DOWNTIME	0.0 PERCENT

ECONOMIC OUTPUT

INTEREST RATE	0.925E+01 PERCENT
ENR INDEX	0.473E+04
CITY MULTIPLIER	0.100E+01
O&M WAGE	0.200E+02 $/HR
COST OF ELECTRICITY	0.100E+00 $/KWHR
COST OF LAND SITE IMPROVEMENT	0.000E+00 $

COST OF STRUCTURE AND SWITCHYARD FOR SINGLE STATION
COST BASED ON 0.28 MGD, BUILT IN 1990

DIAM	NO. OF STATIONS	POWER CAPACITY (KVA)	STRUCTURE COSTS ($)	SWITCHYARD COSTS ($)
6.0	1	0.168E+02	0.104E+05	0.000E+00
8.0	1	0.140E+02	0.104E+05	0.000E+00
10.0	1	0.134E+02	0.104E+05	0.000E+00
12.0	1	0.132E+02	0.104E+05	0.000E+00

COSTS FOR MECHANICAL AND ELECTRICAL EQUIPMENT FOR SINGLE STATION
COSTS FOR STAGE 1 BASED ON 0.284E+00 MGD, BUILT IN 1990

DIAM	HEAD PER STATION	MECHANIC COST	ELECTRIC COST	MISC COST	CONSTRUCT COST	OVERHEAD COST

(IN)	(FT)	($)	($)	($)	($)	($)
6.	0.218E+03	0.275E+05	0.000E+00	0.283E+05	0.861E+05	0.215E+05
8.	0.181E+03	0.254E+05	0.000E+00	0.283E+05	0.834E+05	0.208E+05
10.	0.174E+03	0.249E+05	0.000E+00	0.283E+05	0.828E+05	0.207E+05
12.	0.172E+03	0.248E+05	0.000E+00	0.283E+05	0.826E+05	0.206E+05

OPERATION AND MAINTENANCE COSTS FOR SINGLE PUMP STATION
COSTS FOR STAGE 1 BASED ON 0.189E+00 MGD FROM 1990 TO 2020
SUPPLY COST 0.139E+03 $/YR
LABOR COST 0.289E+04 $/YR

DIAM (IN)	HEAD REQUIRED (FT)	POWER REQUIRED (KWHR/YR)	POWER COST ($/YR)	TOTAL O&M ($/YR)
6.0	0.182E+03	0.692E+05	0.692E+04	0.995E+04
8.0	0.165E+03	0.631E+05	0.631E+04	0.934E+04
10.0	0.162E+03	0.618E+05	0.618E+04	0.921E+04
12.0	0.161E+03	0.615E+05	0.615E+04	0.918E+04

PUMP STATION COST SUMMARY
MOD NO. 1

DIAM (IN)	NO. OF STATIONS	STAGE 1 CAPITAL COST ($)	STAGE 1 O&M COST ($/YR)	STAGE 2 CAPITAL COST ($)	STAGE 2 O&M COST ($/YR)	AVERAGE ANNUAL COST ($/YR)
6.0	1	0.108E+06	0.995E+04	0.000E+00	0.000E+00	0.207E+05
8.0	1	0.104E+06	0.934E+04	0.000E+00	0.000E+00	0.197E+05
10.0	1	0.103E+06	0.921E+04	0.000E+00	0.000E+00	0.195E+05
12.0	1	0.103E+06	0.918E+04	0.000E+00	0.000E+00	0.194E+05

PIPELINE COST SUMMARY
FORCE MAIN MOD 1
PUMP STATION MOD 1

DIAM (IN)	AMORTIZED CONSTRUCTION COST(PIPE) ($/YR)	O&M COST (PIPE) ($/YR)	AMORTIZED CONSTRUCTION COST(PUMP) ($/YR)	O&M COST (PUMP) ($/YR)	AVERAGE ANNUAL COST ($/YR)
6.0	0.304E+05	0.115E+04	0.107E+05	0.995E+04	0.522E+05
8.0	0.402E+05	0.129E+04	0.104E+05	0.934E+04	0.612E+05
10.0	0.500E+05	0.144E+04	0.103E+05	0.921E+04	0.710E+05
12.0	0.599E+05	0.158E+04	0.103E+05	0.918E+04	0.809E+05

DETAILED OUTPUT, SUMMARY OR END?
INPUT MAPS COMMAND
DESIGN DATA FOR FORCE MAIN 3

INPUT FORCE MAIN DATA
DATA PUT AT 11
INPUT MAPS COMMAND
CONSTRUCT FORCE MAIN 3
DATA PUT AT 11

OUT FORCE MAIN 3

OUTPUT FOR FORCE MAIN NO 3

AREA WEST OF SACO RIVER

MAXIMUM FLOW- STAGE 1	0.840E-01 MGD
AVERAGE FLOW- STAGE 1	0.560E-01 MGD
LENGTH	0.305E+05 FT
LENGTH	0.578E+01 MI
INITIAL ELEVATION	0.660E+03 FT
INITIAL PRESSURE HEAD	0.138E+03 FT
FINAL ELEVATION	0.660E+03 FT
FINAL PRESSURE HEAD	0.138E+03 FT
ROUGHNESS HEIGHT	0.400E-03 FT
ALLOWABLE PRESSURE IN PIPE	0.400E+03 FT
RECTANGULAR TRENCH	
DEPTH OF COVER	0.300E+01 FT
DRY SOIL CONDITIONS	
TYPE OF PIPE	
DUCTILE IRON PIPE IS USED FOR ALL DIAMETERS	

HYDRAULIC ANALYSIS AT PEAK FLOW (FIRST STAGE)
0.130 CFS 0.084 MGD

DIAM (IN)	VELOCITY (FPS)	VELOCITY HEAD (FT)	MINOR LOSSES (FT)	FRICTION LOSSES (FT)	HEAD REQUIRED (FT)
6.0	0.662E+00	0.681E-02	0.000E+00	0.118E+02	0.118E+02
8.0	0.372E+00	0.215E-02	0.000E+00	0.294E+01	0.294E+01
10.0	0.238E+00	0.882E-03	0.000E+00	0.102E+01	0.102E+01
12.0	0.165E+00	0.425E-03	0.000E+00	0.430E+00	0.430E+00

HYDRAULIC ANALYSIS AT AVERAGE FLOW (FIRST STAGE)
0.087 CFS 0.056 MGD

DIAM (IN)	VELOCITY (FPS)	VELOCITY HEAD (FT)	MINOR LOSSES (FT)	FRICTION LOSSES (FT)	HEAD REQUIRED (FT)
6.0	0.441E+00	0.303E-02	0.000E+00	0.570E+01	0.570E+01
8.0	0.248E+00	0.957E-03	0.000E+00	0.145E+01	0.145E+01
10.0	0.159E+00	0.392E-03	0.000E+00	0.507E+00	0.507E+00
12.0	0.110E+00	0.189E-03	0.000E+00	0.216E+00	0.216E+00

NO SECOND STAGE

CONSTRUCTION YEAR-STAGE 1	1990	
INTEREST RATE	9.250	%
DESIGN LIFE	30	YEARS
ENR CONSTRUCTION INDEX	4735.0	
LAND COST	0.000E+00	$
CITY MULTIPLIER	1.000	
TERRAIN TYPE--		

DIAM (IN)	PIPE COSTS ($)	OTHER COSTS ($)	CONSTRUCTION COSTS ($)	OVERHEAD COSTS ($)	OPERATION & MAINT. ($/YR)
6.0	0.4531E+06	0.1211E+06	0.5742E+06	0.1435E+06	0.2699E+04
8.0	0.6033E+06	0.1557E+06	0.7590E+06	0.1898E+06	0.3034E+04
10.0	0.7535E+06	0.1905E+06	0.9439E+06	0.2360E+06	0.3375E+04
12.0	0.9035E+06	0.2255E+06	0.1129E+07	0.2822E+06	0.3719E+04

FORCE MAIN COST SUMMARY
MOD NO. 3

DIAM (IN)	CAPITAL COST ($)	O&M COST ($/YR)	AVERAGE ANNUAL COST ($/YR)
6.0	0.718E+06	0.270E+04	0.741E+05
8.0	0.949E+06	0.303E+04	0.974E+05
10.0	0.118E+07	0.337E+04	0.121E+06
12.0	0.141E+07	0.372E+04	0.144E+06

INPUT MAPS COMMAND
STOP - NORMAL TERMINATION